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Volume 6, Number 1

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OIL POLLUTION ABSTRACTS (formerly entitled OIL POLLUTION REPORTS) is a quarterly compilation of abstracts of current oil pollution related literature and research projects. Comprehensive coverage of oil pollution and its prevention and control is provided, with emphasis on the aquatic environment. This issue contains bibliographic citations with abstracts of 1976 to 1979 scientific and technical publications and patents, and summaries of current research projects. The literature and research entries are arranged into nine major categories comprised of thirty-seven specific sub-categores. A permuted Subject Keyword Index provides access to every entry. Author and patent indexes are also included. This report is submitted in partial fulfillment of EPA Grant No. R-805803-01-0 by the Marine Science Institute, University of California, Santa Barbara, under the sponsorship of the U.S. Environmental Protection Agency.

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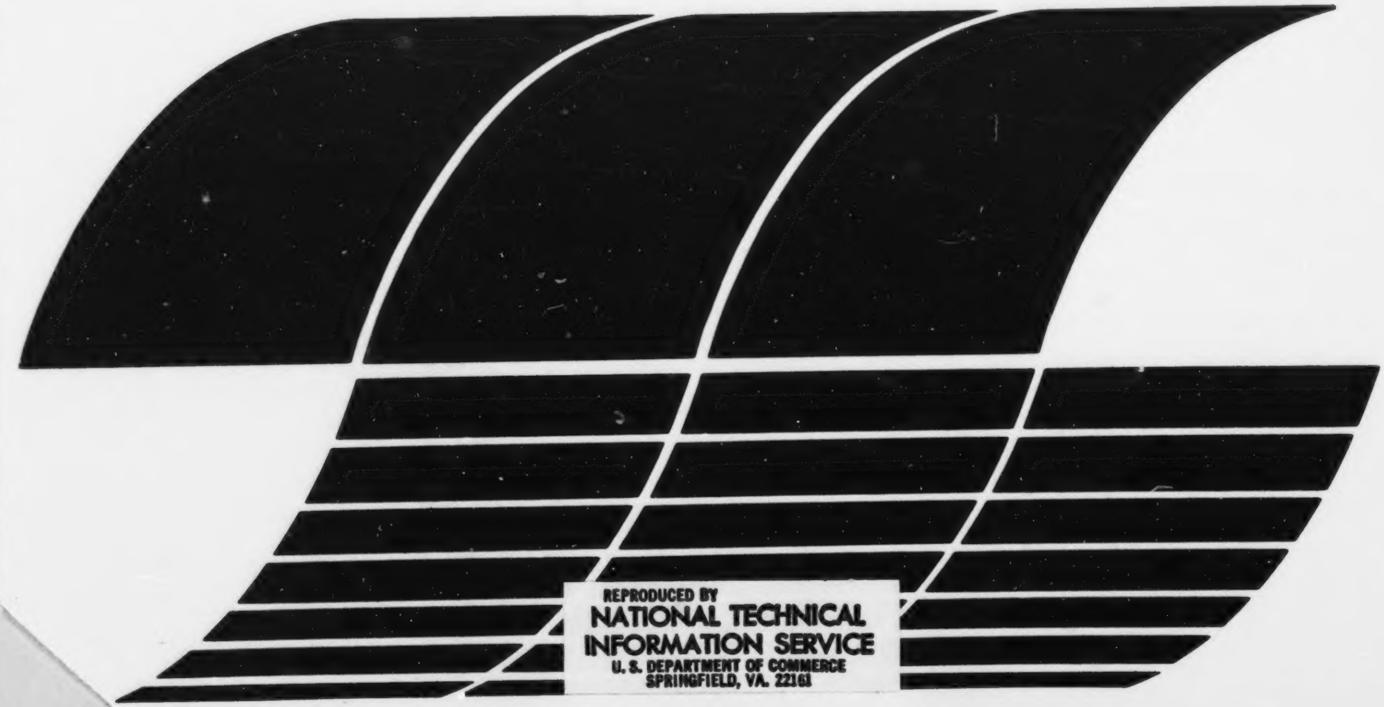

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1. Environmental Health Effects Research
2. Environmental Protection Technology
3. Ecological Research
4. Environmental Monitoring
5. Socioeconomic Environmental Studies
6. Scientific and Technical Assessment Reports (STAR)
7. Interagency Energy-Environment Research and Development
8. "Special" Reports
9. Miscellaneous Reports

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EPA-600/7-79-160
July 1979

OIL POLLUTION ABSTRACTS

Volume 6, Number 1
(January 1979 - March 1979)

by

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and Ivana Roland

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FOREWORD

When energy and material resources are extracted, processed, converted, and used, the related pollutional impacts on our environment and even on our health often require that new and increasingly more efficient pollution control methods be used. The Industrial Environmental Research Laboratory - Cincinnati (IERL-Ci) assists in developing and demonstrating new and improved methodologies that will meet these needs both efficiently and economically.

This report is a product of the above efforts. It cites current events, literature, research, patents, and other materials relevant to the oil pollution abatement program and is published in an abstract format on a quarterly basis. As such, it serves as a basic reference document for all those interested in oil spill and oil pollution control. This project is part of the continuing program of the Oil and Hazardous Materials Spills Branch, IERL-Ci, to assess and mitigate the environmental impact of oil pollution.

David G. Stephan
Director
Industrial Environmental Research Laboratory
Cincinnati

ABSTRACT

OIL POLLUTION ABSTRACTS (formerly entitled OIL POLLUTION REPORTS) is a quarterly compilation of abstracts of current oil pollution related literature and research projects. Comprehensive coverage of oil pollution and its prevention and control is provided, with emphasis on the aquatic environment. This issue contains bibliographic citations with abstracts of scientific and technical publications and patents, covering the year 1976 to 1979, and summaries of current research projects. The literature and research entries are arranged into nine major categories comprising thirty-seven specific sub-categories. A permuted Subject Keyword Index provides access to every entry. Author and patent indexes are also included. This report is submitted in partial fulfillment of EPA Grant No. R-805803-01 by the Marine Science Institute, University of California, Santa Barbara, under the sponsorship of the U.S. Environmental Protection Agency.

OIL POLLUTION ABSTRACTS - TOPICAL OUTLINE

A. OIL POLLUTION DETECTION AND EVALUATION
   1. Detection and Monitoring
   2. Remote Sensing
   3. Sampling and Analysis
   4. Source Identification

B. OIL POLLUTION PREVENTION AND CONTROL
   1. Containment
   2. Cleanup and Removal
   3. Environmental Restoration
   4. Personnel Training
   5. Contingency Planning
   6. Legal and Regulatory Aspects
   7. General Prevention and Control Measures

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION
   1. Biological Aspects
   2. Physical and Chemical Aspects
   3. Social and Economic Aspects
   4. Environmental Response and Recovery
   5. Baseline and Environmental Impact Studies
   6. Legal and Regulatory Aspects
   7. General Aspects

D. FATE OF OIL IN THE ENVIRONMENT
   1. Biodegradation
   2. Physical and Chemical Processes
   3. Models, Simulations, and Predictions
   4. General Fate of Oil

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT, AND PRODUCTION
   1. Biological Aspects
   2. Physical and Chemical Aspects
   3. Social and Economic Aspects
   4. Legal and Regulatory Aspects
   5. General Aspects

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER, AND STORAGE
   1. Tankers and Ships
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   3. Loading and Offloading Facilities
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G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL
   1. Waste Treatment and Disposal Methods
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INTRODUCTION

OIL POLLUTION ABSTRACTS (formerly OIL POLLUTION REPORTS) is a quarterly abstracting series which reviews pertinent scientific and technical publications and research projects to provide its readers with current developments in the field of oil pollution. This issue contains summaries of articles, reports, patents, and other literature relating to oil pollution published after 1975 (Section I), and summaries of current research projects (Section II). A Subject Keyword Index, and author and patent indexes are included. This document series is now identified by volume and issue number; issues prior to 1978 were identified by quarterly dates alone, as shown on the following page.

Subject coverage includes all aspects of oil pollution, with emphasis on the aquatic environment. The literature citations comprising Section I are categorized into nine major topics which, in turn, are divided into thirty-seven specific sub-categories (see p. v). A list of about 150 periodicals regularly reviewed in preparing this series appears in Appendix A.

Section II presents titles of active or recently completed oil pollution research projects, summaries of project objectives, and, if available, information on the current status of and publications resulting from the projects. Notices of research projects and project summaries are obtained primarily from the Smithsonian Science Information Exchange (SSIE). Entries are arranged according to the same topical outline used in Section I. Some of the projects listed in previous issues of OIL POLLUTION ABSTRACTS have been recently renewed. Those projects have been relisted with a current serial number, followed by the original number in pathentheses. In the subject and author indexes, serial numbers listed with the letter "R" denote research project entries.

Each literature and research project entry is provided with a group of several descriptive terms selected from a controlled master list of about 400 keywords (see p. 136), and, when necessary, one or more specific free-language terms prefaced by an asterisk (*). The groups of keywords for each entry are alphabetically permuted by computer to form the Subject Keyword Index. This index enables rapid access to any entry. Author and patent indexes are also provided. An OIL POLLUTION ABSTRACTS availability list with ordering information is included as Appendix B.

OIL POLLUTION ABSTRACTS*

Issues currently available, in press, or in preparation

*This series was formerly entitled
OIL SPILL AND OIL POLLUTION REPORTS (1974 to 1978: Vol.5, No. 1),
and OIL POLLUTION REPORTS (1978: Vol.5, No.2 to Vol.5, No. 4).

	Dates Covered	Report Number
1974	July 74 - Oct. 74	EPA-670/2-75-003
1975	Nov. 74 - Feb. 75	EPA-670/2-75-044
1975	Feb. 75 - Apr. 75	EPA-670/2-75-059
1975	May 75 - July 75	EPA-600/2-76-129
1975	Aug. 75 - Oct. 75	EPA-600/2-76-113
1976	Nov. 75 - Jan. 76	EPA-600/2-76-185
1976	Feb. 76 - Apr. 76	EPA-600/2-76-215
1976	May 76 - July 76	EPA-600/2-76-266
1976	Aug. 76 - Oct. 76	EPA-600/2-77-037
1977	Nov. 76 - Jan. 77	EPA-600/2-77-075
1977	Feb. 77 - Apr. 77	EPA-600/2-77-111
1977	May 77 - July 77	EPA-600/2-77-243
1977	Aug. 77 - Oct. 77	EPA-660/2-78-005
Vol. 5, No. 1	Nov. 77 - Jan. 78	EPA-600/2-78-071
Vol. 5, No. 2	Feb. 78 - May 78	EPA-600/7-78-160
Vol. 5, No. 3	June 78 - Sep. 78	EPA-600/7-78-218
Vol. 5, No. 4	Oct. 78 - Dec. 78	EPA-600/7-79-040
Vol. 6, No. 1	Jan. 79 - Mar. 79	Submitted 4/79
Vol. 6, No. 2	Apr. 79 - June 79	To be submitted 7/79

For complete ordering information, please see Appendix B.

ABBREVIATIONS/ACRONYMS

atm	atmosphere
bbl	barrel
C	carbon
°C	degrees centigrade
cm	centimeter
COW	crude oil washing
DWP	deepwater port
dwt	dead weight ton
EIS	environmental impact statement
°F	degrees Fahrenheit
ft	foot
g	gram
gal	gallon
GC	gas chromatography
GLC	gas-liquid chromatography
gpd	gallons per day
gph	gallons per hour
gpm	gallons per minute
ha	hectare
hr	hour
in	inch
IR	infrared
kg	kilogram
km	kilometers
kn	knot
L	liter
lb	pound
LC	liquid chromatography
LD	lethal dose
LNG	liquefied natural gas
LOT	load on top
LPG	liquefied petroleum gas
m	meter
mg	milligram
mi	miles
min	minute
ml	milliliter
mm	millimeter
MS	mass spectrometry
N	nitrogen
O	oxygen
OCS	outer continental shelf
OPA	OIL POLLUTION ABSTRACTS, formerly OIL POLLUTION REPORTS
oz	ounce
PAH	polycyclic aromatic hydrocarbon
pH	the negative log of the H ion concentration
ppb	part per billion
ppm	part per million
SBT	segregated ballast tank
sp.	species
TLC	thin-layer chromatography
UK	United Kingdom
US	United States
USSR	Union of Soviet Socialist Republics
UV	ultraviolet
VLCC	very large crude carrier
vs	versus
WSF	water soluble fraction
wt	weight
yr	year
μ	micron
μg	microgram
%	percent
/	per
~	approximately
>	greater than
<	less than

ABBREVIATIONS/ACRONYMS (continued)

API	American Petroleum Institute
ASTM	American Society for Testing and Materials
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
DOE	Department of Energy
EPA	Environmental Protection Agency
ERDA	Energy Research and Development Administration
FOA	Food and Agricultural Organization
FEA	Federal Energy Administration
IMCO	International Maritime Consultative Organization
NASA	National Aeronautics and Space Administration
NBS	National Bureau of Standards
NOAA	National Oceanic and Atmospheric Administration
NTIS	National Technical Information Service
SSIE	Smithsonian Science Information Exchange
UN	United Nations
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USGS	United States Geological Survey
USN	United States Navy

SECTION I

REPORTS, PUBLICATIONS, AND PATENTS

A. OIL POLLUTION DETECTION AND EVALUATION

1. Detection and Monitoring

79A-0001
OIL-IN-WATER MONITORING LAGS [news brief]
Anon. 1978.
Sea Technology 19(9):42.

Monitoring, Equipment, Design-engineering, Tankers, Ballast, Oil discharges

About 85% of petroleum entering the ocean from tankers is operational pollution discharged after routine ballasting and tank cleaning operations. According to tanker operators, oil-in-water monitors capable of reliably measuring oil content are not yet available. Such monitoring devices should cover a wide range of oils, hook up with a flow meter and simple data processing equipment, and measure oil content within 10 ppm or 20% of the total, whichever is greater.

79A-0002
THE CONTROL OF ILLEGAL DISCHARGES OF OIL AT SEA [in French]
Author unknown. 1977.
Information Eaux. No. 256, 1977. 13 pages.

Surveillance, Oil discharges, Ballast, Detection, Coastal zone management, Foreign governments, France

Current and future surveillance operations for the detection of illegal ballast discharges and other activities which pollute France's coastal waters are described. Interagency cooperation and agency reorganization are discussed.

79A-0003
NOAA MONITORS BRINE DISPOSAL AT GULF OF MEXICO SITES
Bender, E. 1978.
Sea Technology 19(4):44.

Monitoring, NOAA, Marine organisms, Baseline studies, Models, Environmental effects, Storage, Strategic Petroleum Reserve, Gulf of Mexico, *Brine disposal

A. OIL POLLUTION DETECTION AND EVALUATION

As part of DOE's Strategic Petroleum Reserves project, enormous amounts of brine will be pumped from salt domes along the coasts of Texas and Louisiana into the Gulf of Mexico. The environmental effects on the coastal waters will be monitored by NOAA's Baseline Oceanographic Monitoring Project. [possibly oil pollution related]

79A-0004
MISSILES OR PARACHUTES - HOW TO TRACK OILED ICE
Blackall, P.J. 1978.
Spill Technology Newsletter 3(5):25-26.

Monitoring, Remote sensing, Contamination, Ice, Equipment, *Tracking buoys

Briefly compared are the suitability, costs, and availability of two methods of tracking oil-contaminated ice: a "soft-drop" system employing parachutes in combination with Air-Droppable Random Access Measurement System (ADRAMS) buoys, vs. a "hard-drop" system using high "g" missiles that can service high deacceleration. Based on these comparisons and the results of field tests, the "soft-drop" system is strongly favored.

79A-0005
THE MUSSEL WATCH
Goldberg, E.D., V.T. Bowen, J.W. Farrington, G. Harvey, et al. 1978.
Environmental Conservation 5(2):101-125.

Monitoring, Bioindicators, Hydrocarbons, Chemical analysis, Sampling, Mollusks, *Oysters, Coastal waters, *Mussel Watch Program

The Mussel Watch Program, coordinated by the Scripps Institution of Oceanography, was established in 1976 to monitor pollution levels of 4 categories of pollutants, including petroleum hydrocarbons, by analyzing pollutant concentrations in certain bivalve mollusk species in US coastal waters. This paper outlines the concepts, economics, sampling strategies and analytical procedures involved in the study and detailed results obtained during the first year.

79A-0006
SYSTEMS OF MONITORING AND CONTROLLING HYDROCARBON SPILLS. OLEOMETERS [English summary]
Guigues, F. 1977.
Revue de l'Institut Francais du Petrole 32(3):349-366.

Monitoring, Equipment, Hydrocarbons, Tankers, Ballast, Oil discharges, Law enforcement, International agreements, Pollution control

A. OIL POLLUTION DETECTION AND EVALUATION

The specifications for equipment used to monitor the hydrocarbon content of tanker deballasting water are outlined and various devices commonly used for this purpose are examined. One device that meets specifications is the Ultra-Rapid Response Detector. The availability of such equipment should enable enforcement of the 1973 London Agreement and expansion of maritime trade while allowing portection of the marine environment.

[from Petroleum Abstracts 17(52):#242,781. 1977]

79A-0007
THE MEASUREMENT OF PAHS IN INDUSTRIAL EFFLUENTS
Jones, P.W. 1978.
Proceedings of the Analytical Division of the Chemical Society 15(5): 158-159.

Detection, Analytical techniques, GC/MS, PAH, Aromatic hydrocarbons, Industries, Wastewater

A method using capillary column GC/MS for the detection of PAHs is described and the detection limits are given. [possibly oil pollution related]

[from Chemical Abstracts 98(12):#94291h. 1978]

79A-0008
MONITORING OF HYDROCARBONS IN BENTHIC CRUSTACEANS DURING OFFSHORE DRILLING AND PETROLEUM EXPLORATION
Meyers, P.A. 1978.
Chemosphere 7(5):385-391.

Monitoring, Hydrocarbons, Chemical analysis, Crustaceans, Benthos, Food web, Environmental effects, Offshore drilling, OCS, Texas, Gulf of Mexico

To investigate drilling operations as a possible source of petroleum contamination of the benthos, determinations were made of the hydrocarbon contents of penaeid and stomatopod shrimp collected by trawling at distances of 100 m, 500 m, and 1000 m from an exploratory drilling rig in the northwestern Gulf of Mexico. Only 4 of the 70 samples of crustaceans analyzed showed petroleum contamination. The fact that these 4 samples were collected 6 weeks after the rig and its associated ship activity had left the area "suggests that the petroleum hydrocarbons had been incorporated into the tissues of the affected organisms and that these materials had entered the local benthic food web and potentially could have sublethal deleterious effects upon these shrimps and their predators."

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0009
ANALYZER NOTES OIL IN WATER [product information]
[Teledyne Analytical Instruments]. 1978.
Oil and Gas Journal 76(4):75.

Monitoring, Product information, Equipment, *UV analyzer, *Oil-in-water

A dual wavelength photometric analyzer is described which permits the monitoring of boiler return condensates, effluents from offshore drilling and refineries, and discharges from wastewater treatment plants. Information is available from Teledyne Analytical Instruments, 333 W. Mission Drive, San Gabriel, CA 91776.

2. Remote Sensing

79A-0010
APPLICATION OF THE POLARIZATION EFFECT TO THE REMOTE DETECTION OF OIL SLICKS ON THE SEA SURFACE [in Russian]
Buznikov, A.A., G.A. Ivanian, K.Ia. Kondrat'ev, and D.V. Pozdniakov. 1976.
Radiation Studies in the Atmosphere (A77-47687 22-42).
Leningrad, Gidrometeorizdat, 1976. p. 21-26.

Remote sensing, Oil slicks, Sea surface, *Polarization effect

Summary not available.

[from International Aerospace Abstracts 17(22):#A77-47689. 1977]

79A-0011
USE OF LANDSAT DATA FOR DETECTION OF MARINE OIL SLICKS
Deutsch, M., A.E. Strong, and J.E. Estes. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol. 1:311-318. Paper OTC 2763.

Remote sensing, Oil slicks, Santa Barbara Channel, Detection, *Landsat data, Monitoring, Offshore exploration

This paper illustrates and documents the fact that oil slicks on marine waters have been detected by Landsata data. Reflectance anomalies associated with the slicks have been detected visually on film data, by photo-optical enhancement techniques, and by computer processing, with refinement of digital and optical processing techniques for extracting oil slick information, applications of Landsat oil slick data may include the routine monitoring of coastal waters and the detection of natural seeps such as in the Santa Barbara Channel, which may serve as a worldwide exploration aid.

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0012
NOAA SURFACE MAPPING RADAR: THEORY AND APPLICATION
Evans, M. 1978.
Energy/Environment '78. Lindstedt-Siva, J. (ed.). Society of Petroleum Industry Biologists, 1978. p. 259-270. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Remote sensing, Monitoring, Detection, Sea surface, NOAA, Movement, Spill trajectories

The title radar is a recent development in the field of remote sensing with applications in physical oceanography. The system is named CODAR, Coastal Ocean Dynamics Radar, and is capable of producing a "map" of surface currents covering an area of several thousand km^2 in less than 8 minutes. Areas of potential use for the system include oil spill trajectory monitoring, environmental impact studies, and coastal zone management.

79A-0013
NATURAL OIL SEEP DETECTION IN MARINE ENVIRONMENTS
Eyer, J.A., J.E. Foreman, and G.L. Raney. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol. 1:325-330. Paper OTC 2765.

Remote sensing, Detection, Natural seepage, Marine environment, OCS, Gulf of Mexico, Texas, Louisiana

The documentation of natural oil seeps in an area is a useful tool in offshore oil exploration. This paper presents results of a research project in which the main objective was to determine the feasibility of detecting natural seeps using a combination of electronic and photographic remote sensing systems. The Continental Shelf off Texas and Louisiana was used as a test area, and the remote sensing data were verified by comparison with geologic parameters documented by seismic work and subsequent drilling.

79A-0014
USE OF A CARBON DIOXIDE LASER IN REMOTE DETECTION OF PETROLEUM OIL POLLUTION AT SEA
Kropotkin, M.A. and T.Iu. Sheveleva. 1977.
Soviet Journal of Quantum Electronics 7:513-516.

Remote sensing, Detection, Oils slicks, Sea surface, *CO_2 laser

Summary not available.

[from International Aerospace Abstracts 17(22):#A77-47080. 1977]

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0015
APPLICATIONS OF CHEMISTRY BY BARRINGER RESEARCH LIMITED
Murray, A. 1978.
Chemistry in Canada 30(7):38-43.

Remote sensing, Surveillance, Oil slicks, Canada, *Laser fluorosensor

Barringer Research Ltd. is a multi-disciplinary company employing specialists in a wide range of scientific fields. Included among the recent research projects is the development of an airborne remote sensing laser fluorosensor for surveillance of oil spills.

79A-0016
THE BRAVO BLOWOUT. OIL POLLUTION ANALYSIS ON NORTH SEA WATER 9-11 MAY 1977: PRELIMINARY RESULTS
Ahnoff, M., et al. 1977.
Meddeland fran Havsfiskelaboratoriet, Lysekil, No. 218:4 p.

Chemical analysis, Concentrations, North Sea, Ekofisk blowout, Sweden

Summary not available.

[from Underwater Information Bulletin 10(1):33. #7802/1379. 1978]

79A-0017
DEVELOPMENT OF A RAPID FISH TOXICITY TEST UTILIZING A FREEZE CONCENTRATION TECHNIQUE FOR ROUTINE PETROLEUM REFINERY WASTEWATER MONITORING
Birchard, E.C. 1978.
Progress in Water Technology 9(4):749-759.

Monitoring, Refineries, Water quality, Toxicity, Fish, Biological effects, Analytical techniques, Bioassay, *Freeze concentration technique

Wastewater discharge in Canadian refineries varies from a low of 10 gals/min to 500 gals/min per 1,000 bbls of crude oil processed. Out of the need for a more efficient and accurate test for a variety of contaminants, the title test was developed. "Freeze concentration appears to be a viable technique for increasing toxicity of a refinery effluent and thus shortening the time required to elicit an end-point response in a test organisms. Concentrating an effluent 5 to 1 by volume reduced equivalent mortality response time from 24 to 5 hours for the standard static bioassay and from 96 to 13 hours for the standard flow-through bioassay."

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0018
ANALYTICAL CHEMISTRY AT CARLETON UNIVERSITY
Chakrabarti, C.L. 1978.
Chemistry in Canada 30(7):40.

Chemical analysis, Marine environment, Source identification, Oil spills, Canada

Research activities are listed according to faculty members' interests at the title institution. Current research areas for the author include the Marine Analytical Chemistry Project in collaboration with the National Research Council of Chemistry, Analytical Chemistry Division, and the Marine Oil-Spill-Source Identification Project.

3. Sampling and Analysis

79A-0019
MAXIMUM BIOLOGICAL HALF LIVES OF N-ALKANES (C_9-C_{13}) IN THE SEA MULLET (MUGIL CEPHALUS)
Connell, D.W., and B.M. Bycroft. 1978.
Chemosphere 7(10):779-785.

Food web, Hydrocarbons, Biodegradation, GC, Fish, *Biological half life, *n-alkanes, *Biomagnification, *Mugil cephalus

Because one of the most important factors influencing food chain biomagnification is the biological half life of a substance, and because few data are available on the rate of degradation of aliphatic hydrocarbons in fish, the title determinations have been made. Muscle tissue of sea mullet collected during the spawning run was analyzed by GC. The resulting half-life values which were on the order of 18 days suggest "that the n-alkanes are less likely to exhibit biomagnification than substances known to exhibit this property but further information on the behavior of the n-alkanes under natural conditions is needed to verify this."

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0020
OIL SPILLS AND NATURAL SEEPS: STATUS OF ANALYTICAL METHODS FOR DISTINGUISHING HYDROCARBONACEOUS MATERIALS IN THE MARINE ENVIRONMENT
Craver, C.D. 1977.
Technology Assessment and the Oceans. P.D. Wilmot and A. Slingerland (eds.). Boulder, Colorado, Westview Press, Inc., 1977. p. 152-160. Proceedings of the International Conference on Technology Assessment, Monaco, 26-30 October 1975. (ISTA Documentation Series No. 1)

Natural seepage, Oil spills, Tar, Tankers, Santa Barbara Channel, Analytical techniques, Source identification, Chromatography, Spectroscopy, Marine environment

This paper describes and compares the two major methods, IR spectroscopy and gas chromatography, used in the analysis of spilled oil and natural seepage. Using oil samples from the Santa Barbara Channel, IR spectroscopy is able to clearly distinguish between oil from the platform and oil from natural seeps. However, oil and tar balls at sea resulting from tanker flushings cannot as yet be clearly differentiated and traced; research is underway to provide such methods and to standardize the international approaches to such analyses.

79A-0021
A RAPID AND SENSITIVE QUANTITATIVE METHOD FOR DETERMINING OIL IN WATER
Griffith, K., D. Thomas, C. Ferrin, and C. Deem. 1977.
Oil Field Subsurface Injection of Water. p. 69-78. (American Society for Testing and Materials Special Technical Publication STP 641.)

Sampling, Equipment, Analytical techniques, Oil-water separation, *Quantitative field method

"The quantitative determination of oil in water is made by a turbidity measurement. The method is sensitive to .05 ppm (vol.) or less and is rapid and reasonably accurate...The equipment is not delicate and is portable, which makes it ideal for field testing."

[from Chemical Abstracts 89(10):#80021h. 1978]

79A-0022
INCREASE IN THE SENSITIVITY OF A DETERMINATION OF HEAVY HYDROCARBONS USING SEMICONDUCTOR DETECTORS [in Russian]
Guglya, V.G., G.S. Korobeinik, and A.A. Zhukhovitskii. 1978.
Zavodskaya Laboratoriya 44(5):539-540.

Chemical analysis, Chromatography, Hydrocarbons, *Detection limits, *Semiconductor detectors

The gas chromatography detection limits for a series of alkanes and alkenes were determined using ZnO- and TiO_2-layer semiconductor detectors, and the results are given. [possibly oil pollution related]

[from Chemical Abstracts 89(12):#99295x. 1978]

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0023
INTEGRAL ANALYSIS OF HYDROCARBONS MIXTURES [in German]
Hellmann, H. 1977.
Vom Wasser 49:117-138.

Hydrocarbons, Detection, Analytical techniques, Aquatic environment

"A review, with 19 references, on hydrocarbon mixture detection in the environment." [possibly oil pollution related]

[from Chemical Abstracts 89(8):#64747u. 1978]

79A-0024
USING WATER COLUMN MEASUREMENTS TO ASSESS ENVIRONMENTAL DAMAGES
Hiltabrand, R.R. 1978.
Ocean Industry 13(8):51-52.

Sampling, Chemical analysis, Distribution, *Fluorometry, Detection, Monitoring, Louisiana, Equipment, USCG, Deepwater ports

In developing a system capable of providing rapid measurements of oil concentration in the water column, US Coast Guard Research and Development personnel conducted a field sampling cruise with a towed fluorometer in the vicinity of the proposed LOOP deepwater port site off Louisiana. Oil concentrations detected during the cruise ranged from 30 ppb to 300 ppb, and the instrument was found to perform very well and could easily be applied towards monitoring of an oil spill during an emergency situation. The method is far more rapid and requires less effort than conventional techniques.

79A-0025
HYDROCARBONS POLLUTION ALONG THE COASTAL WATERS OF ROME'S PROVINCE
[English summary]
Ielmini, M., M. Sanna, and A. Memoli. 1977.
Rassegna Chimica 29(1):35-43.

Sampling, Analytical techniques, Hydrocarbons, Contamination, Coastal waters, Italy, *Tyrrhenian Sea

"Gravimetric, chromatographic, and gas chromatographic methods as well as spectrophotometry were used; 275 samples were analyzed, originating from 22 localities... The region of Civitavecchia and Fiumicino was the most contaminated because of the heavy traffic."

[from Chemical Abstracts 89(10):#79897s. 1978]

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0026
FLUOROMETRIC DETERMINATION OF PARTITION COEFFICIENTS OF NAPHTHALENE HOMOLOGUES IN OCTANOL-WATER MIXTURES
Krishnamurthy, T., and S.P. Wasik. 1978.
Journal of Environmental Science and Health A13(18):595-602.

Ananlytical techniques, Chemical analysis, *Fluorometry, PAH, *Partition coefficients, *Naphthalene homologues

A new fluorometric method was used to determine the octanol/water partition coefficients of 12 naphthalene homologues. The results indicate that the technique is well suited for measuring the partition coefficients of PAHs. "The naphthalene homologues are of interest in determining the impact of petroleum spill[s] on the marine environment."

79A-0027
NONPOLAR HYDROCARBONS IN SEA WATERS [in Russian]
Nemirovskaya, N.A., M.P. Nesterova, N.M. Anufrieva, and V.G. Neiman. 1977.
Khimiko-Okeanologicheskie Issledovaniya [Materialy Vsesoyuznoi Konferentsii po Khimii Morei i Okeanov], 7th, Moscow, 1975. B.A. Skopintsev, and V.N. Ivanenkov (eds.). Moscow, USSR, "Nauka", 1977. p. 189-194.

Hydrocarbons, Concentrations, Seawater, Analytical techniques, Spectroscopy, Baltic Sea, Mediterranean Sea, Pacific Ocean, Indian Ocean, *Sea of Japan, *Sea of Okhotsk

Extraction with CCl_4 in combination with IR spectroscopy was used to determine the concentrations of nonpolar hydrocarbons in the Baltic Sea, Mediterranean, northwestern part of the Pacific Ocean, and equatorial part of the Indian Ocean. Concentrations were highest in industrial zones and heavily travelled shipping routes, and negligible in the offshore parts of the Pacific Ocean, Sea of Japan, and Sea of Okhotsk.

[from Chemical Abstracts 89(8):#64936e. 1978]

79A-0028
TOXICITY TESTING WITH SYNCHRONIZED CULTURES OF THE GREEN ALGA CHLAMYDOMONAS
Norland, S., M. Heldal, T. Lien, and G. Knutsen. 1978.
Chemosphere 7(3):231-245.

Toxicity, Mortality, Algae, Photoplankton, Bioassay, Dispersants, *Population growth rates, *Chlamydomonas, *Corexit 9527

The characteristics of the title organism are discussed along with the results from the testing of the toxicity of the oil dispersant Corexit 9527 in order to explain and illustrate the title procedure. The LC_{50} was determined to be 575 ppm.

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0029
MEASUREMENT OF INDEPENDENCE OF FLUORESCENCE AND INFRARED SPECTRA OF OIL
Starks, S.A., and M.L. Curtis. 1977.
Workshop on Pattern Recognition Applied to Oil Identification, Coronado, California, 11-12 November 1976. Piscataway, NJ, Institute of Electrical and Electronics Engineers, 1977. p. 37-46. Proceedings.

Sampling, Spectroscopy, Oil spills, Analytical techniques, Source identification

"Experimental data show a fairly high degree of independence between the IR and fluorescence spectra of oils. Procedures are being developed to apply such combined analysis measurements to the identification of oil spills."

[from Chemical Abstracts 89(10):#77191h. 1978]

79A-0030
SEPARATION AND DETERMINATION OF MINERAL, ANIMAL AND VEGETABLE OILS IN WATER WITH THE USE OF MOLECULAR SIEVE 5A
Uchiyama, M. 1978
Water Research 12(5):299-301

Detection, Analytical techniques, Hydrocarbons, Spectroscopy, Source identification, Adsorption, *Molecular sieve 5A

A new method of measuring the hydrocarbon content of water is reported. The title procedures are described with the following results: "mineral oil was not adsorbed on MS 5A, but animal and vegetable oils were. Oils extracted with carbon tetrachloride were measured by the peak of 2950 cm^{-1} due to the vibrations of the CH groups." [possibly oil pollution related]

79A-0031
ON THE ECOLOGICAL RELEVANCY OF TOXICITY TESTS IN AQUATIC RESEARCH [English summary]
Von Oertzen, J. 1977.
Biologische Rundschau 15(3):160-171.

Toxicity, *Testing techniques, Bioassay, Biological effects

"Short-term tests, long-term tests, functional tests and field or in situ tests as the most important of the main toxicity are investigated with regard to their validity and ecological relevance and appropriate conclusions are drawn. Problems such as standard test types, safe concentrations and super long-term tests are discussed in the same connection. The effects of external and internal factors on the toxicity of water pollutants conclude this review." [possibly oil pollution related]

[from Biological Abstracts 66(3):#18315. 1978]

79A-0032
THE CANADIAN MARINE ANALYTICAL CHEMISTRY STANDARDS PROGRAM
Walton, A., and W.D. Jamieson. 1978.
Chemistry in Canada 30(7):35-37.

Guidelines, Chemical analysis, Surveillance, Monitoring, Legislation, Marine environment, Oil discharges, Foreign governments, Canada

Recent developments in the title program are discussed. Environmental legislation has led to increasing demands for precise chemical analytical data in order to monitor and regulate the discharge of petroleum and other toxic substances into the marine environment.

79A-0033
BEHAVIOR OF C-14 LABELLED METHYL PALMITATE DURING CHROMOTOGRAPHY OF PETROLEUM HYDROCARBONS ON THE SARA COLUMN
Wickramasinghe, R.H., A.L. Mills, R.R. Colwell, and C. Ponnamperuma. 1978.
Journal of Chromatography, Vol. 147:419-420.

Biodegradation, Chemical analysis, Hydrocarbons, Behavior, Chromatography, Crude oil, *C^{14} labelled ester

"In connection with investigations on oil pollution of the marine environment and the microbial degradation of spilled oil, it was necessary to identify the chromatographic behavior of an ester when using this technique. For this purpose, (U-^{14}C) methyl palmitate was used to monitor the behavior of the fractions of crude oil."

[from Biological Abstracts 66(4):#24160. 1978]

4. Source Identification

79A-0034
THE INFLUENCE OF WEATHERING ON IDENTIFICATION OF SPILLED OIL SAMPLE
Bentz, A.P. 1977.
Workshop on Pattern Recognition Applied to Oil Identification, Coronado, California, 11-12 November 1976. Piscataway, NJ, Institute of Electrical and Electronics Engineers, 1977. p. 5-14. Proceedings.

Source identification, Weathering, Physical effects, Analytical techniques, Spectroscopy, *IR, *Simulation

"In the identification of oil spills by use of IR spectra, the effects of exposure to the environment can be simulated by lab treatment or by computer calculations."

[from Chemical Abstracts 89(10):#77190g. 1978]

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0035
INFRARED SPECTRA OF PETROLEUM. DATA BASE INFORMATION AND APPLICATION TO REAL SPILLS
Brown, C.W., and P.F. Lynch. 1977.
Workshop on Pattern Recognition Applied to Oil Identification, Coronado, California, 11-12 November 1976. Piscataway, NJ, Institute of Electrical and Electronics Engineers, 1977. p. 84-96. Proceedings.

Source identification, Analytical techniques, Weathering, Oil spills, Spectroscopy, *IR, *Data base

"IR spectra of 198 unweathered oils and 647 weathered oils were used to provide a data base for determining the source of spilled oil by a ratio method. The method was applied successfully to an actual spill case involving 12 suspect oils."

[from Chemical Abstracts 89(10):#77192j. 1978]

79A-0036
GASOLINE AND FUEL OIL LEAKS FROM UNDERGROUND STORAGE TANKS ARE BEING DETECTED [news brief]
Gass, T.E. 1978.
Ground Water 16(6):464.

Source identification, Detection, Leakage, Contamination, Storage, Fuel oil, Petroleum products, *Tagging

A new method for the title detection involves tagging sources of stored gasoline with small quantities of different perfume musk compounds which, when tested, reveal the source of the leak. The method was developed by Dr. Otto Meresz and a team of researchers from Environment Ontario.

79A-0037
IDENTIFICATION OF PETROLEUM FROM POLLUTED SEA WATER BY FLUORESCENCE ANALYSIS [English summary]
Steiner, A., M. Kolombo, and M. Mastrovic. 1977.
Nafta (Zagreb) 28(11):763-773.

Source identification, Analytical techniques, Detection, Sea surface, Sampling, *Spectrophotometry

A relatively simple and quick method is described for the detection and identification of petroleum and its fractions. Identification is by emission spectrophotometry of fluorescence samples of oil spots on the sea surface. These samples are compared to samples taken from the supposed source of pollution. The method is applicable to simple cases where no significant chemical changes have occurred.

[from Chemical Abstracts 89(10):#79894p. 1978]

A. OIL POLLUTION DETECTION AND EVALUATION

79A-0038
CHARACTERIZATION OF OILS AND SEEPS BY STABLE ISOTOPE RATIOS
Sweeney, R.E., and I.R. Kaplan. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Idustry Biologists, 1978. p. 281-293. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Source identification, Crude oil, Tar, Natural seepage, Sediments, *Isotope ratios

The use of isotope ratios to characterize different sample types and to trace petroleum dispersion in the natural environment was investigated. Thirty-three Southern California crude oils, six natural seep oils, eleven beach tars (asphaltene fractions), and four sediment samples (menthanol eluate) were analyzed for isotope compositions. Sulfer isotope measurements may be a diagnostic property for determining the source of beach-deposited tars and also the amount of petroleum contamination in recent marine sediments.

B. OIL POLLUTION PREVENTION AND CONTROL

1. Containment

79A-0039
EXTENDED SORBENT BOOM LINE PRODUCTS AID SPILL CLEANINGS [product information]
[Acme Products Co.]. 1978.
Oil and Gas Journal 76(9):141.

Spill containment, Spill cleanup, Booms, Sorbents, Product information, *Sorbent booms

Featured is a company's product line of pollution-control equipment, which includes four standard configurations of sorbent booms that are reported to be durable, retentive of shape after oil removal, and made for repeated use. Information on the four booms is available from Acme Products Co., [P.O. Box 51388, Tulsa, OK 74151].

79A-0040
EMERGENCY-CONTAINMENT BOOM IS NEW, DISPOSABLE [product information]
[Conwed Corporation]. 1978.
Oil and Gas Journal 76(46):214.

Spill containment, Booms, Product information, *Disposable boom

Quick response to oil spillage is provided by a line of disposable containment booms constructed of closed cell polyethylene foam. The booms can be assembled without tools and damaged sections can be inexpensively replaced. Information is availalbe from the Conwed Corporation [332 Minnesota St., St. Paul, MN 55164].

79A-0041
CONTROL OF OIL ON WATER
Imperial Chemical Industries Ltd. 1977.
Netherlands Application 77 04,815

Spill containment, Oil slicks, Coalescence, Spill cleanup, Patent

Imprez 100, a silicone and a modified petroleum resin, reduced the spread of petroleum on the surface of water when applied to the periphery of the oil layer.

[from Chemical Abstracts 89(10):#79830q. 1978]

B. OIL POLLUTION PREVENTION AND CONTROL

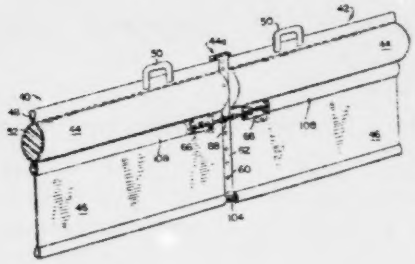
79A-0042
BARRIER FOR WATER CARRIED POLLUTANTS
Preus, P. 1978.
US Patent 4,073,143

Spill containment, Equipment, Booms, Patent, Design-engineering

A spill containment boom is described which comprises a series of boom sections, each section having a generally tubular portion and a skirt portion. Each tubular portion contains a flotation material and arrangements for connecting the boom sections end to end.

[from Underwater Information Bulletin 10(4):#78/08/38. 1978]

4,073,143
BARRIER FOR WATER CARRIED POLLUTANTS
Paul Preus, 21 Smith Road, Toms River, N.J. 08753
Continuation-in-part of Ser. No. 683,189, May 4, 1976, abandoned. This application July 29, 1977, Ser. No. 820,239
Int. Cl.^{2} E02B *15/04, 3/04*
U.S. Cl. 61—1 F **3 Claims**



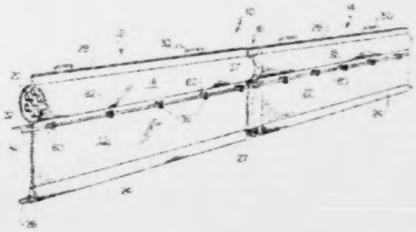
79A-0043
CABLE CONNECTOR ASSEMBLY FOR OIL CONTAINMENT BOOM
Preus, P. 1977.
US Patent 4,045,962

Spill containment, Booms, Patent, Design-engineering, Equipment, *Connector assembly

The title connector assembly comprises a pair of U-shaped anchor shackles, adapted to recieve a threaded anchor pin at the extended ends of the legs thereof. The connector assembly is tightly attached to, and contained in, the skirt section of the boom.

[from Underwater Information Bulletin 10(1):#78/02/62. 1978]

4,045,962
CABLE CONNECTOR ASSEMBLY FOR OIL CONTAINMENT BOOM
Paul Preus, 21 Smith Road, Toms River, N.J. 08753
Filed July 2, 1976, Ser. No. 702,066
Int. Cl.^{2} E02B *15/04*
U.S. Cl. 61—1 F **2 Claims**



B. OIL POLLUTION PREVENTION AND CONTROL

2. Cleanup and Removal

79A-0044
CHEMICAL AGENTS TESTS APPROVED [news brief]
Anon. 1978.
Sea Technology 19(9):42.

*Field tests, EPA, API, Oil spills, *Chemical treatment agents

Field tests for oil spill chemical agents have been approved by the US Environmental Protection Agency. The project is sponsored by the American Petroleum Institute with funds of about $137,000. Four spills of 1660 L (440 gals) each are planned for fall 1978.

79A-0045
COAST GUARD ORDERS SKIMMING SYSTEMS [news brief]
Anon. 1978.
Ocean Industry 13(11):112.

Spill cleanup, Spill removal, Spill containment, Skimmers, USCG, Equipment

The USCG has assigned Offshore Devices Inc. of Peabody, Massachusetts, to add integral wire skimming systems onto the Coast Guard's Open Water Barriers. The skimmers will provide an oil collection capability of up to 750 gpm on the high seas.

79A-0046
DISPERSANTS TESTED FOR SPILL CLEANUP
Anon. 1978.
Oil and Gas Journal 76(42):36-37.

Spill cleanup, Dispersants, California, EPA, API, *Southern California Petroleum Contingency Organization

Recent tests, funded by API and the Southern California - Petroleum Contingency Organization (SC-PCO), were conducted off southern California in order to test the efficacy of dispersants in cleaning up oil spills. Deliberate spills of 1-20 bbl were successfully cleaned up by the Exxon dispersant Corexit 9527 and the British Petroleum dispersant PB11WD. The tests were conducted to convince the Environmental Protection Agency that the dispersants should be allowed for use in spill cleanup operations.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0047
OIL SPILL SERVICE IN PORTLAND AREA [news brief]
Anon. 1978.
Petroleum Engineer International 50(10):16.

Spill cleanup, Spill containment, Equipment, Rivers, Oregon, Pollution control, *Cleanup service

The Clean River Cooperative and the Western Environmental Services Division of Willamette-Western Corporation, both of Portland, Oregon, have created a system to provide rapid cleanup of oil spills in the Columbia and Willamette Rivers of Oregon. The system includes two fast-response containment boom deployment boats, a large self-propelled skimmer boat, eight portable skimmers, and 4000 m (13,000') of containment boom.

79A-0048
PROCESS AND APPARATUS FOR DISPERSING A SHEET OF RESIDUAL OIL
Author unknown. 1977.
French Patent 2,336,515

Spill cleanup, Design-engineering, Equipment, Surfactants, Patent

"Water is driven through a Venturi nozzle and the pressure drop thus created is used to suck a surfactant solution into the stream which is then mixed with the water. This mixture of water and surfactant is then applied to the sheet of residual oil." The process may be applied from a ship.

[from Petroleum Abstracts 18(1):#243,154. 1978]

79A-0049
EFFECT OF THE SALINITY OF SEA WATER ON THE EMULSIFYING PROPERTIES OF SURFACTANTS [in Russian]
Anatonova, N.M., O.S. Mochalova, and M.P. Nesterova. 1977.
Khimiko-Okeanologicheskie Issledovaniya [Materialy Vsesoyuznoi Konferentsii po Khimii Morei i Okeanov], 7th, Moscow, 1975. B.A. Skopintsev, and V.N. Ivanenkov (eds.). Moscow, USSR, "Nauka", 1977. p. 184-188.

Surfactants, Seawater, Oil slicks, Emulsification, Oil removal, Biodegradation, *Salinity

"The effect of seawater salinity on the emulsifying properties of surfactants for the removal of oil films from the water surface was studied. Spraying aqueous surfactants destroyed the oil film and formed a finely dispersed emulsion susceptible to biochemical decomposition. Nonionogenic surfactants...had the highest emulsifying activity which is not strongly affected by the seawater salinity."

[from Chemical Abstracts 89(8):#65051z. 1978]

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0050
OIL AND FUEL SPILL DISPERSANT [product information]
[Ara Chem, Inc.]. 1978.
Pollution Engineering 10(7):74.

Spill Cleanup, Fuels, Dispersants, Product information

"Gold Crew Dispersant is a nonflammable water based concentrate formulated to give rapid and efficient dispersion of oil and fuel spills on water. Oil and fuel fires are quickly extinguished by water containing low concentrations of dispersant. Either sea water or fresh water may be used for dilution." [Address not available]

79A-0051
"SECOND-GENERATION" OIL SPILL CHEMICALS [product information]
Bender, E. 1978.
Sea Technology 19(10):25.

Dispersants, Equipment, Toxicity, Spill cleanup, Product information, *Corexit 9527

The mechanism of dispersant action, techniques of application including the type of equipment required, and circumstances defining their use are presented for 2 water-based dispersants produced by Exxon. The results of toxicity tests for one of these products, Corexit 9527, are given. Among other oil spill chemicals described is a solvent-based product for heavy or waxy oil spills or low temperature conditions.

79A-0052
BANTRY BAY SKIMMER
Catallozzi, E.R. 1978.
Sea Frontiers 24(4):237-239.

Spill cleanup, Skimmers, Ships, Harbors, Ireland, Oil removal

The *Bay Skimmer* is a general supply and patrol vessel equipped to also function as an oil skimming and recovery vessel. The ship is capable of recovering spilled oil at a rate of up to 1900 L (500 gal) per minute by employing a dynamic inclined plane skimming device that forces the oil under the water surface and into a collection well underneath the vessel. The vessel is currently in service at Bantry Bay, Ireland.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0053
SORBENT WICKS PLUS PICKS UP OIL FAST [product information]
[Clark-Cutler-McDermott]. 1978.
Oil and Gas Journal 76(12):174.

Spill cleanup, Spill removal, Sorbents, Product information

The oil sorbent "Quick Wick" is described; it is claimed to provide fast, efficient oil pickup plus outstanding wicking power and durability in various spill cleanup applications. Its open-cell design allows it to pick up 9 to 20 times its weight in oil, depending on the viscosity of the oil. The material is available in pads, rolls and pillows and is reusable. Information is available from Clark-Cutler-McDermott, Franklin, MA 02038.

79A-0054
OIL SORBENT PRODUCTS FEATURED IN PUBLICATION [product information]
[Conwed Corporation]. 1978.
Oil and Gas Journal 76(23):161.

Spill cleanup, Booms, Sorbents, Product information

A complete line of sorbent products for use in oil spill cleanup on land or in water is described. Included are sorbent booms, pillows, blankets, strips, pads, sweeps and other configurations, all comprised of vegetable fibers treated to be hydrophobic and oleophilic. Information is available from the Conwed Corporation, 322 Minnesota St., St. Paul, MN 55164.

79A-0055
WHAT'S NEW IN OIL SPILL CLEANUP EQUIPMENT
Cranfield, J. 1978.
Ocean Industry 13(10):115, 117, 118, 121, 124.

Spill containment, Spill cleanup, Spill removal, Product information, Equipment, Booms, Skimmers

Briefly reviewed are new types of oil spill products and equipment, and new approaches to spill containment and oil removal. Emphasized are new booms, skimmers, and multipurpose vessels produced in Sweden and Norway. Equipment from West Germany and the US is also mentioned.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0056
NEW EEQ ANTI-POLLUTION BARGES [product information]
[Eastern Equipment (Que.) Ltd.]. 1978.
Journal of Canadian Petroleum Technology 17(2):120.

Equipment, Booms, Canada, Product information, *EEQ anti-pollution barge

Designed for all types of anti-pollution work, the EEQ Mk II Petite barge is constructed of marine aluminum double bottoms with buoyancy tank, and equipped with oil booms, chemicals, and anti-oil-spill apparatus. The shallow draft and forward ramp facilitates working right up to beaches and shorelines. The barge can be operated by one person in times of emergencies. For further information, contact Eastern Equipment (Que.) Ltd., [0501 St. Patrick St., La Salle (Montreal), Quebec, Canada].

79A-0057
APPARATUS FOR RECOVERING PETROLEUM AND OTHER SPILLS ON THE SURFACE OF A LIQUID OF GREATER DENSITY
Fernandez Duran, A.A. 1977.
Spanish Patent 450,679

Spill cleanup, Spill removal, Equipment, Patent

"The apparatus contains a series of vacuum-like cleaners with floats with controlled volume. From each cleaner a flexible hose containing a collector in one side and a U-shape take in the other side is connected. The other extremity of the U-shape tube is the outlet of the petroleum into a tank on a boat... The apparatus also has a compressor."

[from Chemical Abstracts 88(26):#197384z. 1978]

79A-0058
THE EFFICIENCY OF INDIGENOUSLY MANUFACTURED POLYURETHANE FOAMS AND DISPERSANTS IN THE REMOVAL OF SPILLED OIL
Fondekar, S.P., R. Sen Gupta, and M.B. Bhandare. 1977.
Mahasagar 10(3-4):151-156.

Spill cleanup, Reuse, Dispersants, Absorption, Sorbents, *Polyurethane foam

In laboratory tests, polyurethane foam absorbed 100% of its weight in heavy furnace oil and could be squeezed out and reused. Dispersants removed oil completely when used in 1:1 ratio. "A non-toxic dispersant was the most effective."

[from Chemical Abstracts 98(12):#91928k. 1978]

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0059
TREATMENT OF OIL SLICK AND OIL SPILL. 1. [in Japanese]
Hagihara, K. 1977.
Sangyo Kogai Boshi Gijutsu. p. 113-118.

Oil slicks, Oil spills, Spill cleanup

"A review with 15 references."

[from Chemical Abstracts 89(10):#79859f. 1978]

79A-0060
BACTERIA HELP CLEAN UP OIL SPILL [product information]
[Hydrocarbon Elimination Co.]. 1978.
Ocean Industry 13(4):68.

Biodegradation, Spill cleanup, Oil slicks, Bacteria, Product information, Wastewaters, Ballast, Oil discharges, Oil removal

The Hydrocarbon Elimination Company has developed a product called NOSCUM, a blend of oil-degrading bacteria, nutrients and inert materials. The product solves three oil spill cleanup problems: 1) Cleanup of oil slicks and hydrocarbon spills in marine or inland waters, shores, and beaches, 2) preventive treatment of offshore well discharges and wastewaters, and 3) elimination of hydrocarbons from tanker ballast and cargo tanks. [address not available]

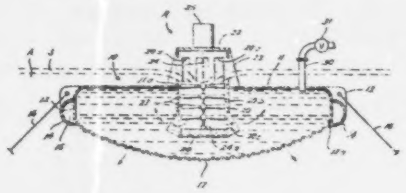
79A-0061
OIL SPILL RECOVERY METHOD AND APPARATUS
Jenkins, R.S. 1977.
US Patent 4,038,182

Oil slicks, Spill cleanup, Oil-water separation, Patent, Equipment

An apparatus for separating floating oil from a water surface is described. The apparatus creates a vortex adjacent to the contaminated water surface and is provided with means for collecting the floating oil film, and for conducting it to a quiescent zone where the oil and water separate. The oil is then removed from the quiescent zone and the water returned to the body of water.

[from Underwater Information Bulletin 10(1):#78/02/21. 1978]

4,038,182
OIL SPILL RECOVERY METHOD AND APPARATUS
Richard Stuart Jenkins, 5821 Dolores, Houston, Tex. 77027
Continuation of Ser. No. 439,219, Feb. 4, 1974, abandoned. This application Jan. 8, 1976, Ser. No. 647,505
Int. Cl.^{2} E02B *15/04*
U.S. Cl. 210—23 R **25 Claims**



B. OIL POLLUTION PREVENTION AND CONTROL

79A-0062
THE USE OF RECYCLE TYRE RUBBER PARTICLES FOR OIL SPILL RECOVERY
Koutsky, J. 1977.
Conservation and Recycling 1(2):231-234.

Sorbents, Absorption, Spill cleanup, Crude oil, Crankcase oil, *Refined oil, *Reclaimed rubber particles

In the title study, rubber particles used ranged from 20-70 mesh size, and wood fines recovered from paper mill processes which were also used, ranged from 40-60 mesh. The speed and the amount of oil uptake by reclaimed rubber particles increased with decreasing particle size and decreased inversely with temperature. Of the 3 types of oil tested - refined oils, used motor oil, and crude oil - the oil pick-up values for the crude oil were lower than those of the refined oils. The estimated absorbent cost for an oil cleanup is ~$13-$26/1,000 L of oil spilled; the cost decreases if wood fines are used since they cost ~$55/ton for shipping.

[from Oceanic Abstracts 15(3):#78-03648. 1978]

79A-0063
A REPLY TO "WHY CLEAN UP OIL SPILLS?"
Levy, E.M. 1978.
Spill Technology Newsletter 3(5):12-14.

Spill cleanup, Arctic, Subarctic regions, Economics, Biological effects, Environmental effects

The author takes issue with a recent article by D. Mac ay [Spill Technology Newsletter 3(4):11-16. 1978] and points out the fallacies in some of Mac ay's arguments pertaining to spill cleanup "in remote areas such as the Arctic when there is no obvious economic damage." Rebutted are Mac ay's statements on economic considerations, and on the lack of widespread or longlasting biological and environmental effects of spills.

79A-0064
ROUGH WATER OIL SKIMMER [product information]
[L.P.I. Corporation]. 1978.
Pollution Engineering 10(3):70.

Spill cleanup, Skimmers, Equipment, Product information, Design-engineering

"The basic principle of the OSED skimmer is the use of a sloping bow to flatten the waves and the oil layer, forcing the oil under the bow, through an inlet slot and into a hull resembling a floating frame. Experiments show an efficiency of approximately 99 percent and the ability to retain the collected oil in rough sea." Various skimmer models are available from the L.P.I. Corporation, P.O. Box 113, Denville, NJ 07834.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0065
OIL SPILL SKIMMER [product information]
[Megator Corporation]. 1978.
Pollution Engineering 10(10):66.

Spill cleanup, Wastewaters, Skimmers, Equipment, Product information

A lightweight, corrosion resistant skimmer for oil removal from calm waters is described. It is designed to direct a controlled flow of surface oil to a circular intake weir in the center of the unit. Information is available from the Megator Corporation [136 Gamma Drive, Pittsburgh, PA 15238].

79A-0066
PORTABLE SKIMMER ENHANCES RECOVERY OF OIL, EFFLUENT [product information]
[Megator Corporation]. 1979.
Oil and Gas Journal 77(4):76.

Spill cleanup, Spill removal, Skimmers, Product information, Equipment

Removal of oil and effluent in calm and sheltered waters is possible with the Sigma Skimmer, made of corrosion-resistant and lightweight plastics. The device weighs only 8 kg (17.6 lbs) and is easily handled and deployed by one person. Information is available from the Megator Corporation, 136 Gamma Drive, Pittsburgh, PA 15230.

79A-0067
A ONE-HUNDRED-TON OIL RECOVERY VESSEL FOR BANTRY BAY
Neal, R.W., R.A. Bianchi, and E. Marcus. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 1:269-279. Paper OTC 2758.

Spill cleanup, Ships, Ireland, *Oil recovery vessel, Equipment, Skimmers, EPA, *OHMSETT facility

Gulf Oil Corporation has added a 100-ton ship, the "Bay Skimmer" to its oil spill response capabilities at its deepwater oil terminal in Bantry Bay, Ireland. The vessel uses the dynamic inclined plane principle for oil skimming and collection. The article describes the vessel, the half-scale recovery performance tests conducted in Boston Harbor and at the EPA OHMSETT facility, and the vessel's stability and seakeeping characteristics.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0068
OIL SKIMMER/COLLECTOR [product information]
[Pollution Control Engineering, Inc.]. 1978.
Pollution Engineering 10(8):52.

Pollution control, Skimmer, Equipment, Product information, Spill removal

A low-cost oil skimmer/collector has been designed for reclaiming oils of differing viscosities, or for use as a part of water recovery wastewater treatment processes. The unit is easily installed and consists of an oleophilic PVC continuous belt and scraper mechanism. Information is available from Pollution Control Engineering, Inc. [10751-B S. Lakewood Blvd., Downey, CA 90241].

79A-0069
NEW PRODUCT CLEANS UP OIL SPILLS, OIL-BASED POLLUTION [product information]
[Proform Products Corporation]. 1978.
Oil and Gas Journal 76(30):71.

Spill cleanup, Dispersants, Spill removal, Product information

"BTO All-Pro is a newly developed, effective, ecologically harmless product for total and safe removal of oil-based pollution. It disperses oil on contact, leaving no trace or residue for cleanup...when applied, it creates a chain reaction resembling tiny explosions causing oil to break down into basic elements and nontoxic components." Information is available from the Proform Products Corporation, 230 California Ave., Suite 210, Palo Alto, CA 94306.

79A-0070
THE LAKE CLEANER - AN ARM AGAINST CONTAMINATION [in Spanish]
Rincon, N. 1977.
Petrol. Tecnol. 1(3):46-49.

Spill cleanup, Lakes, Oil removal, Equipment, Petroleum products, *Lake Maracaibo

Among the pollution sources contributing to the contamination of Lake Maracaibo is the accidental spillage of petroleum products. "Lake Maracaibo presents a series of adverse conditions for the work of collecting oil which is on its surface: 1) varieties in the types of crude oil, e.g., a range of 11° API to 44° API; 2) type of swells; 3) wind; 4) floating solid material; and 5) number of installations. The oil collector is illustrated, and how it operates is described."

[from Petroleum Abstracts 17(52):#242,748. 1977]

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0071
INDUSTRY TESTS OIL SPILL CONTROL METHODS
Rintoul, B. 1978.
Pacific Oil World 71(11/12):23-24.

Oil slicks, Spill containment, Spill removal, Dispersants, Equipment, Skimmers, Environmental effects, Personnel training, Contingency planning, API, California, *Southern California-Petroleum Contingency Organization

A cleanup force that included a cropduster plane, a helicopter and various workboats quickly cleaned up experimental 1-barrel spills of crude oil by the use of dispersants. This demonstration was part of an 18-month research program sponsored by the American Petroleum Institute and the Southern California-Petroleum Contingency Organization. The program was designed to evaluate, test, and provide training and experience in the use of a variety of cleanup techniques, devices, and chemicals. Biological and chemical investigations will be conducted as well.

79A-0072
EQUIPMENT UPDATE
Solsberg, L.B. 1978.
Spill Technology Newsletter 3(5):15-16.

Spill cleanup, Spill removal, Skimmers, Equipment, Canada, *Pumps, Design-engineering

Arctec Canada, Lt., and Eastern Marine Services, Ltd., are testing a number of devices for oil spill cleanup on behalf of the Environmental Emergency Branch of Canada's Environmental Protection Service. Included in the tests are prototypes of several types of skimmers, a new pump, and a pump/separator combination. Skimmer types include a self-propelled catamaran skimmer, an oleophilic disc skimmer, and an advancing, non-rotating, inverted plane skimmer.

79A-0073
BIORECLAMATION BROCHURE [product information]
[Suntech Environmental Group]. 1978.
Oil and Gas Journal 76(24):81.

Biodegradation, Oil spills, Groundwater, Microorganisms, Soil, Hydrocarbons, *Bioreclamation

Oil spills in groundwater can be cleaned up by bioreclamation, a microbiological process in which microorganisms in soils and groundwater are stimulated to multiply and feed on pollutant hydrocarbons, converting them to CO_2 and water. Information is available from the Suntech Environmental Group. Box 1135, Marcus Hook, PA 19061.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0074
OIL-SORBENT PADS AID CLEANUP, CONTROL [product information]
[3M Co.]. 1978.
Oil and Gas Journal 76(8):140.

Spill cleanup, Sorbents, Product information, *Heavy viscosity oils

"Effective cleanup and control of such heavy-viscosity oil spills or deposits as Bunker C or No. 6, particularly in freezing or subfreezing temperatures, is accomplished with this newly introduced Viscous Oil Sorbent Type 356 material." Information is available from the 3M Co. [P.O. Box 33600, St. Paul, MN 55133].

79A-0075
SORBENT PAD FOR OIL SPILL CLEANUP [product information]
[3M Company]. 1978.
Pollution Engineering 10(3):75.

Sorbents, Spill removal, Product information, *Sorbent mats

Viscous Oil Sorbent Type 356 comes in mesh-like pads that permit heavy oils to rapidly and thoroughly penetrate the material. The sorbent will absorb 50 to 250 times its weight depending on oil viscosity. The pads do not absorb water; they float indefinitely even when saturated, and they are easily incinerated or buried after use. Information is available from Environmental Specialties [3M Company, Bld. 223-5S, 3M Center, St. Paul, MN 55101].

79A-0076
OIL ADSORBENT
Tsushi, H. 1977.
Japanese Kokai (patent application) 77 72,385

Spill cleanup, Spill removal, Adsorption, Patent, *Sawdust, *Paraffin

An oil adsorbent is made by adhering granules of a coarse, porous material, such as sawdust, to both sides of sheets of cloth, paper, or non-woven fabrics, and coating with an oleophilic substance such as paraffin.

[from Chemical Abstracts 88(26):#197382x. 1978]

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0077
OIL ADSORBENT
Tsushi, H. 1977.
Japanese Kokai (patent application) 77 72,386

Spill cleanup, Spill removal, Adsorption, Patent, *Cloth, *Paraffin

"An absorbent for the removal of oil spills from water is made by coating coarse cloth or felt of natural or synthetic fibers with paraffin."

[from Chemical Abstracts 88(26):#197381w. 1978]

79A-0078
REAGENT FOR REMOVING OIL SPILLED IN WATER
Tsushi, H. 1977.
Japanese Kokai (patent application) 77,120,291

Spill cleanup, Spill removal, *Sawdust, *Paraffin, Patent

"Sawdust (moisture content 30%) impregnated with paraffin vapor at 80° was used for removing oil spills on water surface. Heavy oil (20 g) floating on water surface was removed by 10 g of the impregnated sawdust."

[from Chemical Abstracts 88(26):#197383y. 1978]

79A-0079
MECHANICAL SYSTEMS FOR THE RECOVERY OF OIL SPILLED ON WATER [book review]
Walsh, D. 1978.
Marine Technology Society Journal 12(4):40.

Spill cleanup, Equipment, Oil removal, Book review

The title publication by the Institute of Petroleum Coordinating Committee for the Prevention of Sea Pollution [Barking, Essex, England, Applied Science Publishers, 1975. 139 p.] is reviewed. According to the reviewer, not enough mention is made of the problems of actual mobilization and logistics for quick spill response. For the products and equipment discussed, the information cutoff was probably in mid-1974.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0080
CLEARANCE OF OIL POLLUTION
Warren Spring Laboratory. 1976.
Stevenage, England, Warren Spring Laboratory, 1976. ___ p.
Newsletter No. 7.

Spill cleanup, Pollution control

Summary not available.

[from Chemistry and Industry, No. 14:608. 1978]

3. Environmental Restoration

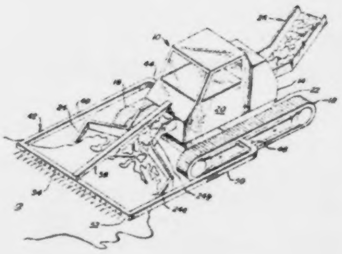
79A-0081
CRYOGENIC BEACH CLEANER
Wend, R.F., et al. 1977.
US Patent 4,043,140

Beach cleanup, Spill removal, Patent, *Cryogenic beach cleaner

An oil-contaminated beach is cleaned by a process which involves, first, providing a source of a liquid cryogen and spraying the contaminated area of beach with the cryogen for a length of time sufficient to solidify the mixture, and second, collecting and removing the solidified oil/sand mixture from the beach.

[from Underwater Information Bulletin 10(1):#78/02/55. 1978]

4,043,140
CRYOGENIC BEACH CLEANER
Robert F. Wendt, 2649 Mason St., Madison, Wis. 53705; Jan R. Acker, 4402 Dwight Drive, No. B, Madison, Wis. 53704, and Norman R. Braton, 457 Agnes Drive, Madison, Wis. 53711
Filed May 12, 1975, Ser. No. 576,687
Int. Cl.² F25C *1/00*
U.S. Cl. 62—66
4 Claims



4. Personnel Training

79A-0082
TOUGH TRAINING RULES IMPOSED OFF U.S.
Anon. 1978.
Oil and Gas Journal 76(2):46-49.

Personnel training, OCS, Offshore drilling, Regulations, USGS, Safety, Pollution prevention, Blowout prevention, Equipment, Platforms, *Standards

B. OIL POLLUTION PREVENTION AND CONTROL

Offshore drilling personnel will have to pass a USGS-approved course in well-control equipment and techniques, and be certified before assignment to OCS drill sites. The major objective of the new standards is to ensure competency of offshore drilling workers and to minimize safety and pollution risks. This article outlines the training requirements for different drilling rig personnel. Blowout prevention and well control procedures are topic areas of special emphasis.

79A-0083
USGS EASES OFFSHORE WELL-CONTROL TRAINING RULES [news brief]
Anon. 1978.
Oil and Gas Journal 76(10):32-33.

Personnel training, USGS, Blowout prevention, Pollution prevention, Guidelines, Offshore drilling, Regulations, *Well-control training

The USGS has modified slightly its recently issued stringent requirements for certifying drilling personnel in well control techniques on offshore oil rigs. The modified guidelines allow personnel that received training between 1975 to 1978 to receive credit for their well-control training, if such training is supplemented by a refresher course prior to December 1, 1979.

5. Contingency Planning

79A-0084
CONTINGENCY PLANS STUDIED AFTER AMLWCH SPILL [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(11):1.

Contingency planning, Oil terminals, UK, Spill cleanup, Crude oil, Estuaries, *Amlwch spill

Contingency plans were under review, following a recent oil spill at the Amlwch, Wales terminal (10 October 1978) in which up to 240 tons of light crude oil were lost. Spill cleanup of the River Conway estuary cost about 250,000 (nearly $500,000).

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0085
MARCO MODULARIZES OILSPILL SKIMMERS FOR EASY TRANSPORT [news brief]
Anon. 1978.
Sea Technology 19(9):43.

Contingency planning, Skimmers, Equipment, USN, Design-engineering, *Skimmer modifications

The Marine Construction and Design Company of Seattle, Washington is modularizing 12 of its existing fleet of oil skimmers vessels so that they can be airlifted for use around the world by the US Navy Sea Systems Command. The 12 skimmers being modified are sectionalized into four parts each, and all mechanical systems will be relocated to fit in a central module.

79A-0086
THE ROLE OF THE U.S. FISH AND WILDLIFE SERVICE IN RESPONDING TO OIL SPILLS
Brown, C.H. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 321. Abstract. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Contingency planning, US Government, Resource management, Fish, Wildlife, Government agencies

The title regulatory agency developed a "Pollution Response Plan for Oil and Hazardous Substances" to reduce potential spill impacts on fish and wildlife resources and to quantify unavoidable damages. The Service's Plan is a key element in the fulfillment of a team approach to spill response as mandated by the Federal Water Pollution Control Act Amendments and the Council on Environmental Quality.

79A-0087
A REVIEW OF RECENT MAJOR OIL SPILLS INCLUDING THE AMOCO CADIZ
Garnett, M.J. 1978.
Spill Technology Newsletter 3(5):17-24.

Contingency planning, Government agencies, Oil spills, Amoco Cadiz spill, Torrey Canyon spill, Pollution control, Spill cleanup

This paper reviews contingency planning, cleanup response measures, and the organization and control of oil spill cleanup operations in order to enlighten those who do not actually attend spills, but retain responsibility. From lessons learned since the Torrey Canyon spill in 1967, the author concludes that the key to efficient spill cleanup is a combination of good contingency planning, organization, and control, and that without these, "no quantity of equipment of high technology will compensate." Far better coordination and cooperation is needed on the national level than is presently apparent.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0088
VULNERABILITY OF COASTAL ENVIRONMENTS TO OIL SPILL IMPACTS
Gundlach, E.R., and M.O. Hayes. 1978.
Marine Technology Society Journal 12(4):18-27.

Contingency planning, Coasts, Shorelines, Beaches, Marshes, Coral reefs, Oil spills, Environmental effects, Coastal zone management, Spill cleanup, *Coastal vulnerability index

Coastal environments are classified on a scale of 1-10 according to potential vulnerability to oil spill damage. The scale emphasizes oil residence time and initial biological impacts. Specific cleanup procedures for each shoreline type are recommended as a basis for local and regional contingency planning.

79A-0089
OIL CONTINGENCY FUND ACT PROMISES MORE THAN IT IS LIKELY TO DELIVER [editorial]
Miller, M. 1978.
National Fisherman 59(9):39-41.

Contingency planning, OCS, Compensation, Liability, Legislation, Fisheries, Oil industry

A critical review is made of the OCS Land Act Amendments of 1978 in regard to the benefits it may offer fishermen in the area of compensation for damages due to activities related to oil and gas exploration, development and production.

6. Legal and Regulatory Aspects

79A-0090
UPCOMING EPA REGULATORY ACTIONS
Anon. 1978.
Pollution Engineering 10(6):77-81.

EPA, Regulations, US Government, Government agencies, *FWPCA, Spill cleanup, Oil discharges, Liability

Tabulated and briefly described are current and upcoming EPA regulations affecting the pollution control field, including new additions to the Federal Water Pollution Control Act (FWPCA). Section 311 on Oil Removal, enacted in May 1978, designates dischargers of oil as those liable for cleanup costs. The rules establish procedures to be followed in order to ensure effective spill cleanup. Contact person for this section is Hans Crump, US Environmental Protection Agency, Washington, DC 20460.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0091
REVIEW OF THE MEDITERRANEAN ACTION PLAN
Bliss, P.A. 1978.
Ocean Management 3(3/4):315-335.

International agreements, International conventions, UN, Baseline studies, Monitoring, Contingency planning, Liability, Pollution prevention, Pollution control, Mediterranean Sea, *Mediterranean Action Plan, *UNEP

Adopted in 1975 by 16 of 18 Mediterranean Coastal States, the title Action Plan called for a coordinated pollution monitoring and research program. The 1977 report of the assessment program stated that "the beaches of the Mediterranean are probably the most polluted by oil and its derivatives of all the seas." The Action Plan called for the development of regional legal agreements concerning marine pollution resulting from shipping, dumping, exploration, and exploitation of the continental shelf and sea-bed, and from land-based sources. Pollution emergencies, liability, compensation, and technological cooperation and training programs are other topics covered by the Action Plan.

79A-0092
INTERNATIONAL POLLUTION TREATIES IN THE MEDITERRANEAN [news brief]
Ress, P.E. 1978.
Environmental Conservation 5(2):100.

Mediterranean Sea, International agreements, Foreign governments, Pollution prevention, Law enforcement

Three treaties pertaining to pollution in the Mediterranean went into effect on 12 February 1978. The first pledges Mediterranean countries to protecting the sea; the second restricts or prohibits the dumping by ships of certain substances, including crude oil and hydrocarbons, into the sea; and the third provides for cooperation among ratifying countries in dealing with massive oil spills. Bi-annual meetings will be held to ensure compliance with the agreements. Other treaties being drawn up address land-based sources of pollution which contribute heavily to pollution in the Mediterranean, and protection of special areas such as marine parks.

B. OIL POLLUTION PREVENTION AND CONTROL

7. General Prevention and Control Measures

79A-0093
NEW PRODUCTS FOR POLLUTION CONTROL. OIL SPILL CONTROL [product information]
Anon. 1978.
Pollution Engineering 10(4):42-43.

Pollution prevention, Pollution control, Spill cleanup, Sorbents, Booms, Spill containment, *Underwater canopy, Product information, Equipment

Tabulated are the main features and applications for eight domestically produced spill control products and equipment. Four types of booms, an underwater oil retention canopy, a spill containment package, a spill prevention system, and a viscous oil sorbent are briefly described.

79A-0094
SUBMERGED TENTS CONTROL LEAKS
Anon. 1978.
Ocean Industry 13(9):186.

Natural seepage, Santa Barbara Channel, Blowouts, Leakage, Platforms, Equipment, Spill containment, *Submerged tents

A method found successful in controlling the Santa Barbara oil seepage problem remaining after the well blowout of 1969 consists of placing specially made fabric tents over the leakage sites. The tents retained the oil, and conduits running from the tents to the platform moved the oil to a recovery site. Today, nine of the twelve structures placed along the fissure are still operating, proving both their durability and economy. The tents were designed and made by the Logan Engineering and Contracting Company [5731 St. Augustine Rd., Jacksonville, FL 32207].

79A-0095
OIL STOP VALVE [product information]
[AFL Industries]. 1978.
Pollution Engineering 10(3):73.

Pollution prevention, Product information, Equipment, *Oil stop valve

An oil stop valve, which employs specific gravity principles, prevents the discharge of separated oil along with water. The valve contains a ballasted float with a specific gravity between that of oil and water. When potential oil spill conditions occur, the float loses buoyancy and sinks into the oil until it seats itself on the water discharge outlet opening. As spill conditions are corrected, the float rises and water resumes discharging through the outlet opening. Information is available from AFL Industries, Inc. [1149 Howard Drive, West Chicago, IL 60185].

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0096
EFFECTIVENESS OF OIL SPILL RESPONSES IN SAN FRANCISCO BAY
Burger, K.R., and W.R. Macke. 1978.
Engergy/Environment '78. J. Lindsted-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 313-320. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Spill cleanup. Personnel training, San Fransisco Bay, Oil transfer, Pollution prevention, *Oil spill response

In 1977 in the title area, over 600 oil and other chemical spills were reported of which 254 were oil from vessels or wharf facilities. The paper identifies and discusses factors which contribute to effective oil spill response. Personal negligence is a key to the current low effectiveness; spill prevention and better techniques for oil transfer operations were recommended.

79A-0097
POLLUTION BARRIERS DATA [product information]
[ChemBar Inc.]. 1978.
Oil and Gas Journal 76(1):111.

Pollution prevention, Groundwater, Lakes, Rivers, Inland, Product information, *Impervious underground barrier

Pollution of groundwater, lakes, ponds, or rivers, in processing operations can be prevented with impervious underground barriers designed to prevent the migration of oil and other pollutants. The barrier consists of an impervious concrete-like mixture. Information is available from ChemBar, Inc., P.O. Box 1077, LaGrange Park, IL 60525.

79A-0098
MONACO MEETING REVIEWS MEDITERRANEAN ACTION PLAN [news brief]
Ekenberger, J.P. 1978.
Ambio 7(1):33.

International agreements, International conventions, Pollution control, Environmental management, UN, Mediterranean Sea, *Mediterranean Action Plan, *UNEP

Member nations noted considerable progress towards achieving the objectives of the title plan, which was adopted in 1975. Developments in planning, legislation, and research in the areas of pollution prevention and control and environmental management are described.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0099
CLEANER BREAKS UP OIL INTO HARMLESS COMPONENTS [product information]
[F/M Marketing Co., Inc.]. 1978.
Oil and Gas Journal 76(12):183.

Spill cleanup, Pollution prevention, Dispersants, Emulsifiers, Product information

The "BTO All Pro Cleaner" is a noncontaminating oil dispersant and emulsifier. Claimed to be nonflammable, nonirritating, and nontoxic, the product is useful in preventing oil leakage from becoming spills around oil rigs, tanks and settling ponds. Information is available from F/M Marketing Co., Inc., P.O. Box 1732, Santa Rosa, CA. 95402.

79A-0100
NEW INNOVATIONS FOR FIGHTING BLOWOUTS
Lewis, J.B., Jr., G.J. Mabie, J.Z. Harris, and R.D. Barnett. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 1:331-335. Paper OTC 2766.

Blowouts, *Blowout control, Offshore drilling, Equipment, Detection

On 24 March 1976, Tenneco Oil Company's West Cameron 165 Well #3, offshore from Cameron, Louisiana, experienced a blowout, and by 11 April 1976 the entire casing string and platform had subsided beneath the surface of the sea. This paper details the innovative use of the Hewlett-Packard Quartz Pressure System and side scan sonar equipment to determine if the blowout well was flowing under the ground and/or beneath the water surface. Also, the Tensor Magnetic Gradient Ranging System was used to determine the distance and direction from the relief well to the blowout well. [possibly oil pollution related]

79A-0101
EMERGENCY SHIPS READY IN NORTH SEA
Mutch, R. 1978.
Offshore 38(10):200, 203.

Pollution control, North Sea, Ships, Safety, *Emergency response vessels

As a result of the Ekofisk blowout in April 1977, two emergency response vessels are now available for North Sea service, the Star Pegasus, a specially equipped firefighting ship, and the Northern Protector, a converted supply ship designed for firefighting, personnel rescue, oil pollution control, and other emergency functions.

B. OIL POLLUTION PREVENTION AND CONTROL

79A-0102
WHAT'S BEEN DONE ABOUT CLEAN WATER - WHAT REMAINS TO BE DONE
Philips, P. 1978.
Outdoor California 39(1):31-33.

Contingency planning, Monitoring, Oil spills, Liability, Pollution control, Spill cleanup, Equipment, Fish, Wildlife, Water quality, California, *Department of Fish and Game

Described is the role of the California Department of Fish and Game (DFG) in maintaining good water quality of both the freshwater and marine environments of the state. The DFG has formulated its own Oil & Hazardous Materials Spill Contingency Plan and was instrumental in developing the state's Oil Spill Contingency Plan. Considerable progress has been made towards clean-water goals, e.g., major reductions in number of tanker-related oil spills in the Los Angeles Harbor, but oil spills continue to cause problems for fish and wildlife. In 1976, the DFG investigated 349 significant oil spills..

79A-0103
WATER POLLUTION TECHNOLOGY [book review]
Simpson, M. 1978.
Journal of Environmental Sciences 21(3):9.

Pollution control, Monitoring, Sources, Analytical techniques, Book review

A favorable review is given of the title book [J.A. Black (ed.). Reston, Virginia, Reston Publishing Co., Inc., 1977. 200 p.]. The book provides information on: marine and freshwater systems, the types, sources, and consequences of pollution, methods for analysis and monitoring of pollutants; and legal aspects of water pollution control. "The book is excellent and recommended as an excellent text for the classroom of undergraduates studying in the fields of water pollution."

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

79A-0104
EFFECTS OF POLLUTION ON FRESHWATER INVERTEBRATES
Anon. 1978.
Journal Water Pollution Control Federation 50(6):1637-1648.

Biological effects, Toxicity, Contamination, Freshwater, Invertebrates, Mollusks, Crustaceans, Hydrocarbons, Dispersants

Recent scientific and technical articles on the ecological effects of pollution and of specific pollutants, including oil, petroleum hydrocarbons, and oil dispersants, on freshwater invertebrates, are reviewed. Organisms for which oil pollution-related articles are cited include amphipods, isopods, insects, and mollusks.

79A-0105
PRAWNS AND POLLUTION [news brief]
Anon. 1978.
Effluent and Water Treatment Journal 18(2):58.

Biological effects, Uptake, Metabolism, Hydrocarbons, Crustaceans, West Indies, *Prawns

Studies off the coast of Aruba in the Dutch West Indies show that scarlet prawns, crustaceans living on the ocean bottom, were found to be three times more abundant in petroleum-polluted areas than in adjacent non-oily areas. Patterns of petroleum hydrocarbon accumulation in the prawns from polluted areas suggest that they metabolize the hydrocarbons.

79A-0106
SHETLAND ISLANDS SPILL KILLS AT LEAST 800 BIRDS [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(3):1.

Birds, Mortality, Spill cleanup, Dispersants, Booms, Tankers, *Shetland Islands, **Esso Bernicia* spill

About 800 dead birds have been recovered from beaches in the title area following the collapse of an inflatable Vikoma boom and the release of about 550 tons of spilled oil. The oil spill from the *Esso Bernicia* may have killed a total of 2000 birds. Dispersants were applied to the slick in Yell Sound after the spill on 30 December 1978.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0107

INHIBITION OF LIGHT-INDUCED pH INCREASE AND O_2 EVOLUTION OF MARINE MICROALGAE BY WATER-SOLUBLE COMPONENTS OF CRUDE AND REFINED OILS
Armstrong, J.E., and J.A. Calder. 1978.
Applied and Environmental Microbiology 35(5):585-862.

WSF, Crude oil, Fuel oil, Toxicity, Algae, *Microalgae, *pH, *Photosynthesis, *O_2 evolution, Biological effects, Sublethal effects

The WSFs of one fuel and two crude oils were found to have differential inhibitory effects on the light-induced pH increase commonly observed in suspensions of whole microalgae cells, and on microalgal photosynthetic evolution of oxygen. Equal concentrations of Southern Louisiana Crude oil WSFs caused simultaneous inhibitions in pH increase and O_2 evolution; a similar effect was observed for the WSF of Jay Crude oil but at lower concentrations. WSFs of No. 2 fuel oil caused pH increase inhibition at lower concentrations than required for a similar effect on O_2 evolution. The results suggest that the toxicity mechanisms of WSFs of No. 2 fuel oil and crude oil may be different and that the main effect may be through interaction with the energy-yielding electron-transport systems.

79A-0108

EFFECTS OF NO. 2 FUEL OILS, NIGERIAN CRUDE OIL, AND USED CRANKCASE OIL ON ATTACHED ALGAL COMMUNITIES: ACUTE AND CHRONIC TOXICITY OF WATER-SOLUBLE CONSTITUENTS
Bott, T.L., and K. Rogenmuser. 1978.
Applied and Environmental Microbiology 36(5):673-682.

WSF, Algae, Toxicity, Environmental effects, Biological effects, Acute effects, Chronic effects, Fuel oil, Crude oil, Crankcase oil, Biomass

The toxicities of WSFs of the title oils to algal communities were studied. Algal biomass was depressed by No. 2 fuel oil extracts, to a lesser extent by crankcase oil extracts, and not at all by Nigerian crude oil extracts. WSFs from No. 2 fuel oil had a greater effect on community composition than the other extracts. Incorporation of ^{14}C was both stimulated and inhibited by exposure to extracts and varied with WSF concentration and length of exposure. Extracts prepared in the light were more toxic than those prepared in the dark.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0109

EFFECTS OF POLLUTION ON FRESHWATER FISH

Brungs, W.A., R.W. Carlson, W.B. Horning, J.H. McCormick, et al. 1978.
Journal Water Pollution Control Federation 50(6):1582-1637.

Bibliographies, Biological effects, Contamination, Fish, Freshwater, Aquatic environment, *Literature review

A literature review of 338 references on the effects of pollution and of specific pollutants on freshwater fish is presented. Included are eight 1975-1977 references covering all aspects of aquatic and terrestrial oil pollution.

79A-0110

MARINE PARKS AND WETLANDS AS NATURAL RESERVES IMPORTANT FOR THE ECOLOGICAL BALANCE OF THE MEDITERRANEAN SEA

Carp, E. 1978.
Ocean Management 3(3/4):167-177.

Conservation, Habitats, Environmental deterioration, Biological effects, Environmental protection, UN, Resource management, Ballast, Mediterranean Sea, *Endangered species, *UNEP, *IUCN

Oil pollution in ports and in the open sea from dumping and spilling of ballast water is but one of the numerous causes of the extreme deterioration and impoverishment of the natural environment in the Mediterranean region. The Mediterranean monk seal as well as all species of marine turtles and several species of birds are threatened with extinction "because of the loss of suitable habitat." The establishment of marine parks and wetlands reserves is one measure suggested to prevent further destruction of critical habitat. The need for development of a conservation masterplan for the entire Mediterranean basin by UNEP and IUCN (International Union for the Conservation of Nature and Natural Resources) is stressed.

79A-0111

EFFECTS OF THE WATER-SOLUBLE FRACTION OF EKOFISK CRUDE OIL ON ZOEAL LARVAE OF THE CRAB HYAS ARANEUS

Christiansen, M.E., and F.C. Stormer. 1978.
Ambio 7(1):23-25.

Biological effects, WSF, Hydrocarbons, Crude oil, Ekofisk blowout, Plankton, Crustaceans, Food web, *Zoeal larvae, *Hyas araneus

At concentrations of 0.3, 1.5, and 3.0 ppm, the WSF of Ekofisk crude oil had no acute effects on the title organism. However, "a long-term effect on survival was observed at the 3.0 ppm concentration. While 95 to 100% of the first zoeal larvae survived to the megalops stage in the control and in the two lower concentrations of hydrocarbons, only 25% reached this stage at 3.0 ppm. It was also found that the duration of zoeal development lengthened significantly with an increase in hydrocarbon concentrations."

79A-0112
A KEROSENE-LIKE TAINT IN THE SEA MULLET *MUGIL CEPHALUS* (LINNAEUS) II. SOME ASPECTS OF THE DEPOSITION AND METABOLISM OF HYDROCARBONS IN MUSCLE TISSUE
Connell, D.W. 1978.
Bulletin of Environmental Contamination and Toxicology 20(4):492-498.

Uptake, Metabolism, Fate, Contamination, Biological effect, Chronic effects, Economic effects, Hydrocarbons, Bioassay, Fish, Fisheries, Australia, **Mugil cephalus*

Described are experiments designed to examine some aspects of the relationship between the uptake, metabolism, and deposition of petroleum hydrocarbons in the title organism and a kerosene-like taint present in its flesh which has caused significant economic loss to the Australian fisher. "The results obtained indicate that the deposition of absorbed hydrocarbons in different segments of the muscle tissue is proportional to the lipid content of the segment... Metabolic processes in the sea mullet result in the preferential degradation of the n-alkanes leaving a hydrocarbon mixture in the sea mullet enriched with iso-alkanes and related compounds."

79A-0113
TOXICITY AND SUBLETHAL EFFECTS OF NO. 2 FUEL OIL ON THE SUPRALITTORAL ISOPOD *LYGIA EXOTICA*
Dillon, T.M., J.M. Neff, and J.S. Warner. 1978.
Bulletin of Environmental Contamination and Toxicology 20(3):320-327.

Toxicity, Sublethal effects, Mortality, Fuel oil, WSF, Bioassay, Concentrations, Gulf of Mexico, Crustaceans, **Lygia exotica*

A spill of 1.5 million L (400,000 gal) of Bunker C residual oil and No. 2 fuel oil into west Galveston Bay in 1973 caused a large mortality among local populations of the title organism. To provide a data base for evaluating the role of No. 2 fuel oil, experimental exposure of *Lygia* to WSFs and oil-in-water dispersions (OWD) of No. 2 fuel oil was performed. Bioassays yielded the following results: "TLm values of over 100% for the WSF and 73 ppm at 24 and 48 hours and 36.5 ppm at 96 hours for the OWD" indicated relatively low toxicity, and respiration was insignificantly affected by short-term exposure. Analysis of several specimens of *Lygia exotica* collected 3 days after the spill from the impact site showed high concentrations of dibenzothiophenes.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0114

DETECTION OF EGGS FROM OIL-FED BIRDS BY ULTRAVIOLET FLUORESCENCE OF YOLK EXTRACTS

Grau, C.R., T.A. Wooton, T.E. Roudybush, W.N. Holmes, et al. 1978. Energy/Environment '78. J. Lindsted-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 297-300. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Birds, Biological effects, Crude oil, Detection, *Fluorometry, *Anas platyrhynchos, *Eggs

Groups of Mallard ducks (Anas platyrhynchos) were fed food containing 1% or 3% of four different crude oils for several months. Analysis of the 48 eggs laid revealed that all 36 eggs from oil-fed birds were different from all 12 control eggs. No distinctive differences were observed between eggs from ducks fed different crude oils.

79A-0115

THE UPTAKE AND RELEASE OF PETROLEUM HYDROCARBONS BY THE MARINE MUSSEL MYTILUS EDULIS

Hansen, N., V.B. Jensen, H. Appelquist, and E. Morch. 1978. Progress in Water Technology 10(5):351-359.

Uptake, Release, Hydrocarbons, Aromatic hydrocarbons, Mollusks, Bioassay, Biological effects, *Tagging, *Mytilus edulis

Exposure of the title organism to seawater solutions of 4 radiolabeled hydrocarbons resulted in rapid accumulations of toluene, naphthalene, and phenanthrene. These aromatic hydrocarbons were also released rapidly when the mussels were transferred to clean seawater. The alkane, hexadecane, was taken up, as well as released, far more slowly. The coefficients of variation of hydrocarbon accumulation between individual mussels were 18-32% for the aromatic hydrocarbons and 54% for hexadecane. The results indicate that the title processes are passive ones dependent on partitioning between the water and tissue lipids.

79A-0116

ACUTE TOXICITY OF SEVERAL OIL DISPERSANTS TOWARDS THE GREEN ALGAE CHLAMYDOMONAS AND DUNALIELLA

Heldal, M., S. Norland, T. Lien, and G. Knutsen. 1978. Chemosphere 7(3):247-255.

Dispersants, Toxicity, Biological effects, Algae, *Chlamydomonas reinhardti, *Dunaliella marina

"The majority of the oil dispersants studied were more toxic to the green algae C. reinhardti and D. marina than to previously studied animals. The plate method, with Chlamydomonas as the test organism, had many advantages...and gave results which were comparable to the more accurate though laborious tube test with *Dunaliella*.... Studies of the effects of the mixtures of crude oil with dispersants (1:1) showed that the compounds act on general cellular structures or processes."

[from Chemical Abstracts 89(13):#101124m. 1978]

79A-0117
THE EFFECTS OF INGESTED PETROLEUM ON LAYING IN MALLARD DUCKS (*ANAS PLATYRHYNCHOS*)
Holmes, W.N., J. Cronshaw, and K.P. Cavanaugh. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 301-309. Proceedings of a Symposium on Energy Development Impacts, Los Agneles, 22-24 August 1978.

Birds, Biological effects, Crude oils, Reproduction, **Anas platyrhynchos*, *Ingestion

Mallard ducks fed food containing 3% South Louisiana crude oil demonstrated an 80% decline in the mean daily rate of laying, a 33% decrease in eggshell thickness, and more than 80% degeneration of the developing eggs. Among mated birds, the incidence of fertilization declined 75%, and only 40% of the fertilized eggs yielded viable ducklings, as compared to a normal hatchability rate of 88%. Mallards fed a diet of 1% South Louisiana crude oil showed no variation in the mean daily rate of laying, but no eggs had been fertilized and shell thickness was 19% below normal.

79A-0118
SOME EFFECTS OF INGESTED PETROLEUM ON SEAWATER-ADAPTED DUCKS (*ANAS PLATYRHYNCHOS*)
Holmes, W.N., J. Cronshaw, and J. Gorsline. 1978.
Environmental Research 17(2):177-190.

Birds, Contamination, Mortality, Toxicity, Biological effects, Chronic effects, Crude oil, Fuel oil, *Ingestion, **Anas platyrhynchos*

The effects of ingestion of food contaminated with South Louisiana crude oil, Kuwait crude oil, or No. 2 fuel oil in seawater-adapted ducks were investigated. No overt symptoms of stress were observed when birds were maintained under sheltered (27° C) laboratory conditions. Hyperphagia did develop and was most apparent in birds given South Louisiana crude oil and least apparent in those given No. 2 fuel oil. Exposure to stressful conditions (3° C) resulted in earlier and greater mortality rates for birds fed petroleum-contaminated food than for either freshwater- or seawater-adapted cold-stressed or control groups. The effects of exposure to various environmental stressors (hypertonic water, cold, and petroleum) on mortality rates appear to be additive. Histological data are included in the results.

79A-0119
EFFECTS OF CRUDE OILS ON THE GROWTH OF ARCTIC MARINE PHYTOPLANKTON
Hsiao, S.I.C. 1978.
Environmental Pollution 17(2):93-107.

Phytoplankton, Crude oil, Sublethal effects, Growth, Mortality, Biological effects, Arctic, *Diatoms

The effects on growth in 4 species of phytoplankton of exposure to various types and concentrations of crude oil at 0°, 5°, and 10° C were investigated. Chlamydomonas pulsatilla was generally less sensitive to growth and lethal effects of exposure than the diatoms, Chaetoceros septentrionalis, Nauvicula bahusiensis, and Nitzchia delicatissima. The results are presented in a table and a series of graphs.

79A-0120
FISH TOXICITY OF JET FUELS: I. THE TOXICITY OF THE SYNTHETIC FUEL JP-9 AND ITS COMPONENTS
Jenkins, D., S.A. Klein, and R.C. Cooper. 1977.
Water Research 11(12):1059-1068.

Fuel oil, WSF, Fish, Toxicity, Mortality, Sublethal effects, Uptake, Release, Growth, *Jet fuel

The title study determined lethal concentrations of the title fuel and its components on Notemigonus crysoleucas. The effects of the WSFs of the fuel and its components on egg hatchability and fry development in Jordanella floridae and Salmo gairdneri, and the accumulation and release of the compounds, were also examined and the results are presented.

[from Biological Abstracts 66(2):#12055. 1978]

79A-0121
CAROTENOIDS AND THE RESISTANCE OF MARINE MOLLUSKS TO ENVIRONMENTAL POLLUTION [English summary]
Karnaukhov, V.N., N. Yu. Milovidova, and I.N. Kargopolova. 1977.
Zhurnal Evolyutsionnoi Biokhimii i Fiziologii 13(2):134-138.

Mollusks, *Carotenoids, Marine organisms, Biological effects, Metabolism

A study of the carotenoid content of various marine mollusk species indicated that those with a high content show greater resistance to marine pollution than those with low levels. In addition, the species studied increased their carotenoid levels after exposure to pollution. The results "suggested [the] role of carotenoids in oxidative metabolism of animal cells and in the adaptation of these cells to hypoxic conditions." [possibly oil pollution related]

[from Biological Abstracts 66(3):#18323. 1978]

79A-0122
THE UPTAKE, DISTRIBUTION, AND DEPURATION OF ^{14}C BENZENE AND ^{14}C TOLUENE IN PACIFIC HERRING, *CLUPEA HARENGUS PALLASI*
Korn, S., N. Hirsch, and J.W. Struhsacker. 1977.
Fishery Bulletin 75(3):633-636.

Fish, Hydrocarbons, Aromatic hydrocarbons, Sublethal effects, Uptake, Release, Metabolism, Toxicity, Biological effects, *Benzene, *Toluene, *Tissues

The title study was performed using sublethal benzene and toluene concentrations of 100 ppb. Toluene accumulated faster and to a greater degree than benzene in all tissues except the gallbladder and intestine. After a 7-day depuration period, detectable levels of the hydrocarbons remained only in the gallbladder, intestine, and pyloric ceca. These findings support "the contention that benzene and toluene are metabolized in the liver, stored in the gallbladder, then passed into the intestine and are excreted with the feces." Toluene poses a particular hazard to fish as it "could be rapidly accumulated to high levels...after even a brief contact during an oil spill."

[from Biological Abstracts 66(2):#12070. 1978]

79A-0123
THE EFFECT OF OIL AND OIL PRODUCTS ON SOME BLUE-GREEN ALGAE [English summary]
Kravchenko, M.E., and L.D. Gapochka. 1977.
Izvestiya Akademii Nauk SSSR, Seriya Biologicheskaya, No. 2:52-56.

Algae, Petroleum products, Toxicity, Growth, *Photosynthesis, Biological effects, *Blue-green algae

"The toxicity of these products decreases with their concentration in the medium. The greatest inhibition of growth and photosynthesis occurs at concentrations of 0.1-1.0 g/l".

[from Biological Abstracts 66(3):#16894. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0124
THE EFFECT OF NAPHTHALENE ON SURVIVAL AND ACTIVITY OF THE AMPHIPOD *PARHYALE*
Lee, W.Y., and J.A.C. Nicol. 1978.
Bulletin of Environmental Contamination and Toxicology 20(2):233-240.

Biological effects, Toxicity, Mortality, Concentrations, Aromatic hydrocarbons, Amphipods, *Naphthalene, **Parhyale*

Experiments comparing the effect of naphthalene, a volatile compound believed to be one of the major toxic components of petroleum oils, on the title animal in closed and open systems are described. In closed systems heavy mortality >50%, occurred at concentrations >5ppm; in open systems the survival rate was 85 to 95% of *Parhyale* at naphthalene concentrations ranging from 6 to 10 ppm. "A persistent damaging effect was found in survivors from both open and closed systems, this effect appeared at much lower concentrations among survivors from the closed vessels."

79A-0125
BIOLOGICAL EFFECTS OF OIL POLLUTION - A COMPREHENSIVE BIBLIOGRAPHY WITH ABSTRACTS
Light, M., and J.J. Lanier. 1978.
US Coast Guard Report No. CG-D-75-78. 641 p.

Bibliographies, Biological effects, Contamination, Toxicity, Oil spills, Behavior, Biodegradation, Animals, Plants, Vertebrates, Invertebrates, Marine organisms, Chemical analysis, Microorganisms

"This bibliography is a compilation of abstracts of literature on the biological effects of oil pollution. Comprehensive coverage is provided on oil spill incidents, toxicity, tainting, behavioral effects, physiological effects, biodegradation, effects of cleaning agents, analyses for petroleum hydrocarbons in tissues and other related topics." Over 1200 references with abstracts are included, and a permuted subject-keyword index is provided for rapid topical access and cross referencing of any given abstract.

79A-0126
BIOLOGICAL EFFECTS OF OIL ON EARLY DEVELOPMENT OF THE BALTIC HERRING *CLUPEA HARENGUS MEMBRAS*
Linden, O. 1978.
Marine Biology 45(3):273-283.

WSF, Hydrocarbons, Fish, Toxicity, Mortality, Biological effects, *Eggs, *Larvae, Development, Crude oil, Fuel oil, Contamination, Baltic Sea

The effects of WSFs of two crude oils and one fuel oil on various early developmental stages of the title species were investigated. Fertilization

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was not affected by exposure to the WSFs, while embryonic activity, heart rate, and hatching time were affected. 70 – 100% of the larvae were malformed or dead within one day of hatching. Exposure of eggs to hydrocarbons resulted in decreased lengths of the larvae. "The results are discussed in relation to the potential effects of oil spills and chronic oil pollution on fish eggs and larvae in the Baltic Sea."

[from Biological Abstracts 66(3):#18286. 1978]

79A-0127
THE EFFECT OF CRUDE OILS ON SALT GLAND SODIUM SECRETION OF ORALLY IMPOSED SALT LOADS IN GLAUCOUS-WINGED GULLS, *LARUS GLAUCESCENS*
McEwan, E.H. 1978.
Canadian Journal of Zoology 56(5):1212-1213.

Crude oil, Fuel oil, Metabolism, Birds, Biological effects, *Salt gland, *NaCl secretion, **Larus glaucescens*

"Glaucous-winged gulls treated orally with 1.0 g of bunker C or marine diesel fuel oil and then loaded with NaCl, secreted 55% and 45% of the NaCl load in 30 min (compared to 53% in controls not treated with fuel oils). The values were not significantly different implying that the oil had no effect on the salt gland Na secretion."

[from Chemical Abstracts 89(11):#85466s. 1978]

79A-0128
MUTAGENIC EFFECT OF PETROL IN *DROSOPHILA MELANOGASTER* I. EFFECTS OF BENZENE AND 1,2-DICHLOROETHANE
Nylander, P.O., H. Olofsson, B. Rasmuson, and H. Svahlin. 1978.
Mutation Research 57(2):163-167.

Invertebrates, Biological effects, Chronic effects, Aromatic hydrocarbons, *Petrol, *Benzene, *1,2-dichloroethane, *Mutagenesis

Commercial petrol and 1,2-dichloroethane showed mutagenic activity when fed to larvae of the title organisms through their food supply. No mutagenic effects were exhibited by benzene.

[from Chemical Abstracts 89(11):#85269e. 1978]

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C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0129
OXIDATIVE TRANSFORMATION OF COMPLEX MIXTURES OF POLLUTANT AROMATIC HYDROCARBONS BY FISH
Payne, J.F., and N. May. 1978.
Chemosphere 7(10):815-819.

Aromatic hydrocarbons, PAH, Chromatography, Fish, Aquatic environment, Biodegradation, Biological effects, Carcinogens, Metabolism

"This work demonstrates that a wide variety of aromatic hydrocarbons entering the aquatic environment are susceptible to oxidative biotransformation by fish liver oxidase enzymes. The potential for reactive metabolite production by MFO [mixed function oxidase enzymes] is thus considerable... The fate of PAH metabolites is of interest in relation to hydrocarbon mutagenesis and carcinogenesis and there is evidence that metabolites may be retained in tissues after parent hydrocarbon depuration."

79A-0130
EFFECT OF THE POLLUTION OF WATER WITH SOME CHEMICAL COMPOUNDS ON FISH [in Polish]
Prost, M. 1978.
Medycyna Weterynaryjna 34(4):205-211.

Toxicity, Biological effects, Fish

"A review with 44 references." [possibly oil pollution related]

[from Chemical Abstracts 89(13):#101024d. 1978]

79A-0131
TOXICITY OF PETROLEUM PRODUCTS: EFFECTS ON ALKALINE PHOSPHATASE AND LIPID PEROXIDATION
Rao, G.S., and K.P. Pandya. 1978.
Environmental Research 16(1-3):174-178.

Toxicity, Hydrocarbons, Petroleum products, Solvents, Bioassay, Acute effects, Biological effects, Metabolism, *Alkaline phosphatase, *Lipid peroxidation

"Liver lipid peroxidation was increased in the rat after intraperitoneal administration of benzene, Iomex, petroleum ether, or gasoline. Increases in lipid peroxidation and alkaline phosphatase activity were observed, while only a slight decrease in glucose-6-phosphatase activity was noted. The effects of a single dose of benzene on alkaline phosphatase and lipid peroxidation in rat liver and kidney lasted up to 20 days."

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C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0132
HYDROCARBONS IN SAND CRABS (EMERITA ANALOGA) FROM SOUTHERN CALIFORNIA (U.S.A.)
Rossi, S.S., G.W. Rommel, and A.A. Benson. 1978.
Chemosphere 7(2):131-141.

Hydrocarbons, Biogenic hydrocarbons, Crustaceans, Chemical analysis, Marine organisms, Natural seepage, *Emerita analoga

The hydrocarbon contents of Emerita analoga from three beaches were analyzed and the results are given. Crabs from beaches exposed to natural oil seepage were more severely tainted by petroleum hydrocarbons than those from beaches exposed to small boat traffic. Crabs from San Nicolas Island, 85 km offshore, contained only biogenic hydrocarbons.

[from Chemical Abstracts 89(13):#101093a. 1978]

79A-0133
PETROLEUM HYDROCARBON RESISTANCE IN THE MARINE WORM NEANTHES ARENACEODENTATA (POLYCHAETA: ANNELIDA), INDUCED BY CHRONIC EXPOSURE TO NO. 2 FUEL OIL
Rossi, S.S., and J.W. Anderson. 1978.
Bulletin of Environmental Contamination and Toxicology 20(4):513-521.

Biological effects, Development, Hydrocarbons, WSF, Fuel oil, Bioassay, Invertebrates, Polychaetes, *Resistance, *Inheritance of resistance, *Neanthes arenaceodentata

Three different life stages (larva, juvenile, and adult) of 3 successive generations of the title organism were continuously exposed to sublethal concentrations of WSF from No. 2 fuel oil. Bioassays showed no development of resistance in the larval stage over 3 generations whereas F_1, F_2, and F_3 adults exhibited equally increased petroleum hydrocarbon resistance compared to control adults. In juveniles, however, increased resistance over that of the F_1 generation was observed in the F_3 juveniles.

79A-0134
EFFECT OF POLYCYCLIC AROMATIC HYDROCARBONS ON HEPATIC MICROSOMAL ENZYMES AND DISPOSTION OF METHYLNAPHTHALENE IN RAINBOW TROUT IN VIVO
Statham, C.N., C.R. Elcombe, S.P. Szyjka, and J.J. Lech. 1978.
Xenobiotica 8(2):65-72.

PAH, Hydrocarbons, Aromatic hydrocarbons, Biological effects, Metabolism, Fish, *Hepatic mircosomal enzymes, *Salmo gairdneri

The effects of three PAHs on xenobiotic metabolism in Salmo gairdneri were studied. All three compounds caused increased hepatic arylhydrocarbon hydroxylase activity and increased microsomal cytochrome P-450 levels, but did not alter glucuronyl transferase activity. Trout pretreated with 2,3-benzanthrene showed increased metabolism and biliary excretion of 2-methylnaphthalene in vivo. "The induction of mono-oxygenation by polycyclic aromatic hydrocarbons can result in significant effect on the metabolism and excretion of xenobiotics by fish in vivo." [possibly oil pollution related]

[from Biological Abstracts 66(3):#18375. 1978]

79A-0135
TOXICITY OF OIL TREATING AGENTS IN FISHES AND SHELLS [in Japanese]
Togura, M., Y. Suzuki, and H. Kimura. 1977.
Aichi-ken Suisan Shikenjo Gyomu Hokoku 1976:63-65.

Dispersants, Toxicity, Biological effects, Marine organisms, Fish, Mollusks, *Clams

"Toxicity of the dispersants Gamlen LT [67185-53-9] and Neos AB200 [67185-46-0] to fish (medaka) and shells (surf clam, short-necked clam, etc.) was studied at 23-28° under lab conditions. For example, the 48 h-LC_{50} values of Gamlen LT and Noes AB200 were 1750 and 6400 ppm, respectively, for surf clam."

[from Chemical Abstracts 89(13):#101142r. 1978]

79A-0136
HYDROCARBONS OF OYSTERS AND SHORT-NECKED CLAMS IN HIROSHIMA BAY
Yasuda, S., and N. Fukamiya. 1978.
Bulletin of the Japanese Society of Scientific Fisheries 44(5):521-524.

Hydrocarbons, Biogenic hydrocarbons, Chemical analysis, GLC, Mollusks, Marine organisms, Uptake, Metabolism, *n-Alkanes, *Crassostrea gigas, *Tapes japonica

The n-alkane distribtuions in the oyster Crassostrea gigas and the clam Tapes japonica collected from Hiroshima Bay were analyzed by GLC. An absence of odd-carbon predominance was found, indicating that the hydrocarbons were not of biogenic origin. The clam fecal hydrocarbon profile revealed a predominance of even-carbon n-alkanes. After a 30-day starvation period, a predominance of shorter-chain even-carbon n-alkanes was evident with a disappearance of the shorter-chain, odd-carbon n-alkanes. The results indicate that low-level oil pollution of the organisms had occurred and that the petroleum hydrocarbons were retained in the tissues following starvation.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

2. Physical and Chemical Aspects

79A-0137
BENTHIC HYDROCARBONS OF RHODE ISLAND SOUND
Boehm, P.D., and J.G. Quinn. 1978.
Estuarine and Coastal Marine Science 6(5):471-494.

Hydrocarbons, Sediments, Benthos, Distribution, Chemical analysis, Chromatography, Rhode Island, *Rhode Island Sound, *Arctica islandica

A study was conducted to determine the distribution of hydrocarbons in surface sediment, sediment cores, and ocean quahog (Arctica islandica) in Rhode Island Sound, and to assess the effects of hydrocarbon input from a dredge spoil deposit on the normal hydrocarbon geochemistry of the area. Analysis of the types and quantities of hydrocarbons in the samples were performed by gas chromatography. The results are presented and indicate that the effects of the dredge spoil are insignificant beyond 2 km from disposal site. The presence of an increase in the percentage of unresolved components at a particular depth in the sediment core may be useful as a chemical marker signalling the increasing use of petroleum products towards the end of the 19th century.

79A-0138
GROUND WATER POLLUTION (CITATIONS FROM THE AMERICAN PETROLEUM INSTITUTE DATA BASE)
Brown, R.J. 1978.
Report NTIS/PS-78/0143. 134 p.

Groundwater, Contamination, Petrochemicals, Analytical techniques, Pollution prevention, Bibliographies

"The bibliography, which contains 123 abstracts, includes abstracts of world-wide research on the contamination of groundwater, especially from petroleum and petrochemical sources. Causes, phenomena, prevention, control, and analysis are among the subjects covered."

[from Chemical Abstracts 89(8):#64767a. 1978]

79A-0139
TEMPORAL VARIATIONS AND PROBABLE ORIGINS OF HYDROCARBONS IN THE WATER COLUMN OF BEDFORD BASIN, NOVA SCOTIA
Gordon, D.C., Jr., P.D. Keizer, and J. Dale. 1978.
Estuarine and Coastal Marine Science 7(3):243-256.

Chemical analysis, Hydrocarbons, Aromatic hydrocarbons, Biogenic hydrocarbons, Sources, *Seasonal variations, *Bedford Basin, *Nova Scotia

Fluorescence spectroscopic and gas chromatographic analyses of hydrocarbons in Bedford Basin over a 16-month period revealed the following: 1) n-alkane and crude oil equivalent concentrations were slightly higher at 2 m than at 50 m; 2) crude oil equivalent concentrations were slightly higher than those usually found in oceanic waters; 3) the highest hydrocarbon concentrations occurred in the winter and the lowest in the summer; and 4) the majority of the hydrocarbons found were of anthropogenic rather than biogenic origin. High winter concentrations may be a result of increased fuel consumption in the surrounding urban area during the colder months.

79A-0140

THE URQUIOLA OIL SPILL, LA CORUNA, SPAIN: IMPACT AND REACTION ON BEACHES AND ROCKY COASTS

Gundlach, E.R., C.H. Ruby, M.O. Hayes, and A.E. Blount. 1978.
Environmental Geology 2(3):131-143.

Oil spills, Distribution, Sedimentation, Fate, Shorelines, Beaches, Environmental effects, Onshore impacts, Urquiola spill

A study was conducted in the first few weeks following the 12 May 1976 Urquiola spill on the title impacts. The following results were obtained: 1) Oil accumulation on the beaches was affected by wave activity, quantity of oil present and tidal stage, and was heaviest along the high tide swash line; 2) depth of burial of oil-soaked beach sediment layers was related to wave energy and sediment type and was greatest on a high-energy, coarse-sand beach; 3) distribution of oil on rocky shores was related to wave energy and degree of coastline exposure; accumulation was greatest in sheltered areas with low wave activity.

79A-0141

DISPERSION OVER WATER: A CASE STUDY OF A NONBUOYANT PLUME IN THE SANTA BARBARA CHANNEL, CALIFORNIA

Maas, S.J., and P.R. Harrison. 1977.
Joint Conference on Applications of Air Pollution Meteorology, Salt Lake City, 1977. p. 12-15. Preprints.

Hydrocarbons, Natural seepage, Distribution, Physical effects, Santa Barbara Channel, *Salinity

"The dispersion of hydrocarbon effluents released by an active seep ~2.4 km south of Coal Oil Point, California was studied. Traces of airborne hydrocarbon concentrations closely resembled cross-wind Gaussian distributions. The underlying water surface significantly reduced the turbulence."

[from Chemical Abstracts 89(8):#64298y. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0142
DISCHARGE OF ALKANES DURING OFFSHORE OIL PRODUCTION IN THE BUCCANEER OILFIED
Middleditch, B.A., B. Basile, and E.S. Chang. 1978.
Bulletin of Environmental Contamination and Toxicology 20(1):59-65.

Hydrocarbons, Offshore production, Platforms, Oil discharges, Detection, Environmental effects, Baseline studies, Gulf of Mexico, *Alkanes

As part of a multidisciplinary study by the National Marine Fisheries Service to determine the environmental effects of routine offshore oil production in the northwestern Gulf of Mexico, alkane content of the discharged brine from two production platforms in the title oilfield was measured. The mean concentration of C_{12}-C_{36} alkanes in 18 samples collected over a period of 18 months was approximately 2 ppm (2 mg/L) which represents a daily discharge rate of 491 g alkanes.

3. Social and Economic Aspects

79A-0143
THE ST. PETER OIL SPILL: AN ECOLOGICAL AND SOCIO-ECONOMIC STUDY OF EFFECTS, COLOMBIA-ECUADOR, MAY-JUNE 1976
Jernelov, A., et al. 1976.
Swedish Water and Air Pollution Research Laboratory (IVL), 1976. Report EPA ID#04209A. __ p.

Oil spills, Socioeconomic effects, Biological effects, Fisheries, *Colombia, *Ecuador, *St. Peter spill

Severe reductions in population size of local marine organisms were one of the short-term primary effects of the title oil spill. A short time later, biological studies showed that organisms had returned in abundance and sizes that made contaminated areas indistinguishable from unaffected localities. However, the secondary socioeconomic effects were of greater magnitude and longer duration; these were a sharp reduction in income for persons engaged in fishing or fish marketing, and in tourism.

[from Environmental Management 2(2):175-176. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

4. Environmental Response and Recovery

79A-0144
OIL SPILLS - THE CAUSES AND THE CURES
Hull, E.W.S. 1978.
Sea Frontiers 24(6):360-369.

Fate, Oil spills, Chronic effects, Biodegradation, Bacteria, Spill cleanup, Microorganisms, Sources, *Petrophiles

In this general article on oil pollution sources and response measures, the ocean's ability to absorb or dissipate the adverse effects of large spills is emphasized. Considered to be far more damaging are the continual chronic releases of smaller amounts of petroleum at a specific location, creating a stressed environment. A promising method for pollution control and spill cleanup is the development and use of petrophilic bacteria that can rapidly biodegrade petroleum hydrocarbons. Several new developments in this area are briefly described.

79A-0145
HYDROCARBONS IN THE MARINE ENVIRONMENT. II. DISTRIBUTION OF N-ALKANES IN THE FAUNA AND ENVIRONMENT OF THE SUB-ANTARCTIC ISLAND OF SOUTH GEORGIA
Mackie, P.R., H.M. Platt, and R. Hardy. 1978.
Estuarine and Coastal Marine Science 6(3):301-313.

Hydrocarbons, Distribution, Environmental effects, Biogenic hydrocarbons, Fish, Benthos, Sediments, Antarctica, *n-alkanes

A gas chromatographic analysis of alkane concentrations and distributions in sediment, fish, benthos, and land plant samples from King Edward Cove indicate that n-alkanes typically found in petroleum were absent in the samples studied despite the presence of leaking fuel oil storage tanks and tar on the beaches.

79A-0146
APPLICATION OF AN OIL SPILL VULNERABILITY INDEX TO THE SHORELINE OF LOWER COOK INLET, ALASKA
Michel, J., M.O. Hayes, and P.J. Brown. 1978.
Environmental Geology 2(2):107-117

Oil spills, Fate, Dispersion, Decomposition, Contingency planning, Prediction, Shorelines, Environmental effects, Offshore development, Alaska, *Cook Inlet

Over 1200 km of shoreline in Cook Inlet were classified as erosional (45%), neutral (38%), or depositional (17%), and then subclassified into 16 categories. A vulnerability index of potential oil spill damage was applied to this classification to predict the longevity of oil spilled in the Inlet. It was estimated that in the event of a spill, oil would remain for less than 6 months along 45% of the coastline, up to one year along 13.4% of the coastline, and 2-10 years or longer for 41.5% of the coastline. It was suggested that "the use of this type of vulnerability indexing, in conjunction with a biological susceptibility index and oil spill trajectory models, would provide a rational basis for decision making concerning the location of on- and off-shore oil facilities and the design of oil spill contingency plans."

79A-0147

THE EFFECT OF PRUDHOE BAY CRUDE OIL ON A TIDAL-FLAT ECOSYSTEM IN PORT VALDEZ, ALASKA
Naidu, A.S., H.M. Howard, and S.A. Norrell. 1978.
Annual Offshore Technology Conference 10(1):97-104.

Crude oil, Intertidal zone, Marine organisms, Beaches, Sediments, Biological effects, Fate, Physical effects, Alaska, *Tidal flats

Crude oil applied to the surface of the Island Flat sediments had no effect on the organic matter contents or the meiofaunal bacterial populations in the sediments. Petroleum penetrated to a depth of 1 cm and was not detected after 2 months. A decrease of heavy metals in the sediments was found. "The crude oil stranded on the tidal flat surfaces even for a short time during tidal cycles probably alters the pH and Eh significantly to mobilize the heavy metals from the sediment to the overlying tidal waters."

[from Chemical Abstracts 89(12):#92702u. 1978]

79A-0148

THE SIGNIFICANCE OF THE SANSINENA INCIDENT
Soule, D.F., M. Oguri, J.K. Dawson, R. Osborn, et al. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 295. Abstract. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Oil spills, Fuel oil, Biological effects, Recovery, California, Sansinena spill

The explosion of the Sansinena in December 1976 and the subsequent loss of 20,000-30,000 bbl of Bunker C fuel was the first spill of Bunker C in an area with a five-year pre-episode data base. It was therefore possible to document the impacts of Bunker C on the biota and the recovery rates.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0149
SUBLETHAL EFFECTS OF NATURAL CHRONIC EXPOSURE TO PETROLEUM IN THE MARINE ENVIRONMENT
Straughan, D. 1976.
API Publication No. 4280. 119 p.

Natural seepage, Sublethal effects, Chronic effects, Marine environment, Habitats, Marine organisms, Invertebrates, Santa Barbara Channel

Field surveys, supported by laboratory research, were conducted from 1972 to 1974 at Coal Oil Point, an area of natural seepage in the Santa Barbara Channel. Data on the sublethal effects of natural chronic exposure to oil on marine organisms were compared with those from several offshore Southern California control sites. "The studies were designed in terms of interspecies comparisons and not intercommunity comparisons. They encompassed most segments of the environment, most invertebrate groups and most habitat types; species chosen were sedentary in their habits in order to exclude transitory migrants." Results for each habitat and species are presented.

5. Baseline and Environmental Impact Studies

79A-0150
CALIFORNIA PROJECT MEASURES MAN'S IMPACT ON COAST WATERS
Bender, E. 1978.
Sea Technology 19(6):26-31.

Monitoring, Hydrocarbons, Environmental effects, Coasts, *Southern California Bight, *SCCWRP

The Southern California Coastal Water Research Project (SCCWRP), founded by 5 local government agencies in 1969 and receiving additional support by EPA and other organizations, has carried out a wide variety of environmental studies and monitoring programs. Petroleum hydrocarbons are one of the pollutants which have been measured.

79A-0151
INTEGRATED ENVIRONMENTAL STUDIES, SOUTH TEXAS OUTER CONTINENTAL SHELF: APPROACH, TECHNIQUES, RESULTS
Berryhill, H.L, Jr. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 1:237-249.
Paper OTC 2754.

Texas, OCS, Baseline studies, BLM, Marine organisms, Chemical analysis, Hydrocarbons, Sediments

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

Baseline studies of the South Texas OCS were initiated by the Bureau of Land Management in 1974. This paper presents an integrated synthesis of data reported to the BLM in three administrative reports covering the first year of study (1975). Included are results of studies of nutrients and productivity, biological activity, water chemistry, surficial sea floor sediments, trace metals in surficial sediments, hydrocarbon abundance, geology, and oceanography.

79A-0152
ECOLOGY OF THE EMPEROR GOOSE IN ALASKA
Eisenhauer, D.I., and C.M. Kirkpatrick. 1977.
Wildlife Monographs, No. 57:1-62.

Baseline studies, Conservation, Birds, Wildlife, Habitats, Environmental effects, Offshore development, Resource management, Oil spills, Alaska, *Anser canagicus

A baseline study was performed on the nesting ecology and behavior of the emperor goose Anser canagicus, "with preservation of the species and its habitat as a goal." Among the suggestions for management towards this end were "wildlife refuge jurisdiction to regulate oil operations over their offshore area, discouragement of tanker traffic within the range of the emperor goose, [and] development of methods to contain oil spills."

[from Biological Abstracts 66(3):#13823. 1978]

79A-0153
WASHINGTON BASELINE STUDY PROGRAM
Gardner, F. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 35-46. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Baseline studies, Environmental effects, Contamination, Economic effects, Coastal waters, Estuaries, Washington, *Sensitivity rating

A baseline study of marine and estuarine waters of Washington was conducted. The study provides information to decision-makers on the biological and economic effects of oil contamination and on significant biological resources. Additionally, the data will assist in assigning priorities to areas sensitive to oil contamination, either from a spill or from chronic contamination, and in siting oil refineries or oil transfer locations in that state.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0154
THE OUTER CONTINENTAL SHELF ENVIRONMENTAL STUDIES PROGRAM--OBSERVATIONS AND RECOMMENDATIONS
Hay, K.G. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 3-11. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Baseline studies, OCS, BLM, Offshore development, Environmental effects, *Environmental Studies Program

Administered by the BLM, OCS baseline studies were designed to identify critical parameters necessary for analysis and prediction of the effects of OCS oil and gas development. Shortcomings of the current program are: 1) a failure to conduct a systematic review and analysis of the existing evidence of impacts from past OCS development; 2) the lack of an interagency vehicle for the exchange of information and coordination of data gathering; 3) the fallibility of baseline data as a reliable indicator of man-induced change; 4) the lack of hypothesis of the possible ecological effects of OCS petroleum development against which data may be tested; 5) the failure to address impact probability for the decision-maker; and 6) the failure to incorporate environmental data in the decision-making process.

79A-0155
BLM'S ENVIRONMENTAL STUDIES ON THE PACIFIC OCS
Keene, D. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 13-18. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Baseline studies, OCS, BLM, Environmental effects, Pacific Ocean, California

In light of the BLM's reassessment of the OCS Environmental Studies Program, the Pacific OCS Office's plans for Southern and Northern California are presented. Candidate study topics for Fiscal Year 1979 and beyond are outlined; however, due to the formative stage of developing the plans, existing information may resolve some uncertainties about proposed study issues.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0156
MID-ATLANTIC OUTER CONTINENTAL SHELF BENCHMARK STUDIES
Lynch, M.P. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 1:231-235. Paper OTC 2753.

BLM, Baseline studies, OCS, Atlantic Ocean, Hydrocarbons, Sediments, Benthos, Zooplankton, Neuston

During 1975, the Bureau of Land Management initiated an extensive study of the mid-Atlantic OCS area off New Jersey, Delaware, Maryland, and Virginia. This paper presents the principal findings of the first year of baseline studies, which included extensive hydrocarbon and trace metal analysis of bottom sediments, benthos, zooplankton, neuston, and suspended sediments. Preliminary evaluation of the aliphatic hydrocarbons data from the mid-Atlantic region indicates the outer shelf area is relatively free from hydrocarbon contamination.

79A-0157
HOW TO PREPARE ENVIRONMENTAL REPORTS FOR DRILLING ON THE OCS
Mulligan, H.F., and C.A. Menzie. 1978
Oil and Gas Journal 76(27):86-87.

OCS, USGS, Regulations, Offshore exploration, Offshore production, EIS

All OCS exploration and oil-gas development programs must now be preceded by environmental reports prepared according to US Geological Survey Regulation 250.34-3, "Environmental Reports," as presented in the Federal Register 43(19) of 27 January 1978. This article discusses and tabulates the general approaches to be taken in data acquisition, and report preparation and submittal.

79A-0158
ENVIRONMENTAL CONDITIONS ON THE CONTINENTAL SHELF OFF WEST GREENLAND
Nielsen, H.A., J. Dietrich, and J. Fabricius. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 3:533-546. Paper OTC 2948.

Offshore exploration, Greenland, OCS, *Environmental conditions, Baseline studies, Arctic, Ice

Baseline and environmental data collection programs in the title area were carried out during 1975 and 1976 in order to provide sufficient data for planning and carrying out oil exploration activities. Discussed in this paper are meteorological conditions, wave conditions, current conditions and ice conditions of the West Greenland continental shelf region.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0159
ENVIRONMENTAL ASPECTS OF MAFLA SHALE
Palmer, H.D. 1978.
Petroleum Engineer International 50(11):10-11.

Baseline studies, EIS, BLM, USGS, Environmental effects, OCS, Oil-gas leasing, Gulf of Mexico, *MAFLA area

Intensive environmental baseline studies conducted under BLM contracts in the offshore Mississippi-Alabama-Florida (MAFLA) area reveal "a complex marine environment essentially free from evidence of pollution." The region encompasses 89 tracts included in the OCS Sale 65. USGS stipulations for development of such tracts include surveys for cultural resources and for "live bottom" areas supporting extensive benthic communities to assure minimal environmental disturbance.

79A-0160
CULTURAL RESOURCES ON THE SOUTHERN CALIFORNIA COAST, ISLANDS AND CONTINENTAL SHELF: A BASELINE STUDY PROVIDES DATA PERTINENT TO FUTURE OIL AND GAS EXPLORATION
Stickel, E.G. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 19-33. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Baseline studies, OCS, BLM, *Cultural resources, Offshore development, Pacific Ocean, California, *Southern California Bight

An OCS baseline study of the cultural resources in the Southern California Bight region was conducted and summary findings are presented. By federal mandate, cultural resources should be taken into account by projects such as oil and gas exploration. This paper examines the kinds of data which might be affected by such projects.

79A-0161
THE SHETLAND SCENE: LANDWARD ASPECTS OF OIL EXPLORATION AND DEVELOPMENT IN THE NORTHERN NORTH SEA
Syratt, W.J. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 195-205. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Oil terminals, Environmental effects, Onshore impacts, Pollution prevention, Development, North Sea, *Shetland

The environmental impact of an oil terminal and related development at Sullom Voe and the measures taken to protect the Shetland environment are described. Oil from the fields in East Shetland Basin will be transported by pipeline to the land terminal and, when fully operational, there will be daily arrivals of up to three tankers and one LPG tanker. Environmental considerations in the planning, development, and operational stages of the project are discussed, including baseline studies and biological monitoring, the potential for oil spills, and spill cleanup operations and equipment.

79A-0162
AMOP EXPERIMENTAL OIL SPILL PLANNING UPDATE
Thornton, D.E. 1978.
Spill Technology Newsletter 3(5):9-11.

Spill cleanup, Pollution control, Incineration, Oil discharges, Behavior, Fate, Arctic, Subarctic regions, *Experimental spills

Five high-priority studies were identified by the Arctic Marine Oilspill Program Committee; each of these would require the experimental discharge of oil into an Arctic or sub-Arctic marine environment. The five projects are entitled 1) Oil and Gas Under Beaufort Sea Ice: Behavior, Fate and Countermeasures (Burning); 2) Oil in East Coast Pack Ice: Behavior, Fate and Countermeasures; 3) Oil on Arctic Shorelines: Behavior, Fate and Countermeasures (Spring 1980-1982); 4) Oil on Cold Water: Countermeasues (Summer 1979-Summer 1981); 5) Oil in Arctic Nearshore Environments: Fate, Effects and Countermeasures (Summer 1979-1982).

79A-0163
ECOSYSTEM PROCESS ANALYSIS - A NEW APPROACH TO IMPACT ASSESSMENT
Truett, J.C. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 69-75. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Baseline studies, OCS, NOAA, Environmental effects, Ecosystems, Beaufort Sea, Alaska, *Ecosystem process analysis

An ecosystem process analysis is being tested by NOAA's OCS Environmental Assessment Program as a new strategy for impact assessment. The test study region is a coastal area of the Beaufort Sea, Alaska, and the work focuses on ecosystem processes which 1) support organisms identified to be of special interest to society and 2) are judged to be directly vulnerable to development activities.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0164
ECOLOGICAL CHARACTERIZATION OF COASTAL ECOSYSTEMS OF THE UNITED STATES AND ITS TERRITORIES
Watson, J.F. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.) Society of Petroleum Industry Biologists, 1978. p. 47-53. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Environmental management, Government agencies, Coasts, Ecosystems, Information systems, Models, *Ecological characterization

The US Fish and Wildlife Service has generated several ecological characterizations for reasons including: Integration of complex ecological information; identification of data gaps; prediction and assessment of environmental impacts; and assistance in developing mitigative procedures and alternatives for minimizing environmental impacts. The characterization is designed to obtain and synthesize available environmental data and to provide an analysis of the functional relationships between the different components of an ecosystem and the dynamics of that system. [possibly oil pollution related]

6. Legal and Regulatory Aspects

79A-0165
OIL POLLUTION EFFECTS ON COASTAL ENVIRONMENT AND LIVELIHOOD OF FISHERMEN
Anon. 1978.
Australian Fisheries 36(9):4-7.

Pollution prevention, Economic effects, Oil spills, Legislation, International conventions, Australia

"Some of the measures adopted in Australia to combat oil pollution are summarized along with new provisions to control the discharge of oil at sea by ships and tankers. The National Plan to Combat Pollution of the Sea by Oil represents the combined efforts of the Commonwealth and the State governments, with the assistance of the oil industry, to help provide a solution to the threat posed by oil spills from ships."

[from Oceanic Abstracts 15(3):#78-03693. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

79A-0166
AMOCO CADIZ RESEARCH CONTINUES [news brief]
Anon. 1978.
Sea Technology 19(9):42.

Amoco Cadiz spill, France, NOAA, *CNEXO, Coasts, *Ongoing research programs

The aftereffects of the Amoco Cadiz spill continues to be studied in research projects undertaken by NOAA and the French Centre National pour L'exploitation des Oceans (CNEXCO). After the supertanker broke up in March 1978, about 62,000 tons of oil reached the Brittany Coastline, with 18,000 tons estimated onshore after a month. Currently 40,000 to 50,000 tons of oil are estimated to be on the nearshore ocean bottom. $2 million have been contributed by Amoco Transport Company to support the ongoing research.

79A-0167
EMISSIONS AND EFFLUENTS FROM EUROPEAN REFINERIES (CONCAWE REPORT 6/77, OCTOBER 1977)
Anon. 1978.
The Science of the Total Environment 10(1):86.

Wastewaters, Wastewater treatment, Refineries, Pollution control, Europe, *CONCAWE

A review is given of a paper which discusses the environmental impact of gaseous and liquid effluent discharges from refinery operations in Europe. Future trends in pollution control are discussed as well as the effectiveness of the current methods and technologies. Additional information is available from CONCAWE, 60 Van Hogenhoucklaan, The Hague, 2018, Netherlands.

79A-0168
SOUTH AFRICAN MARINE POLLUTION SURVEY REPORT 1974-1975
Cloete, C.E. 1976.
Pretoria, South African Council for Scientific and Industrial Research, National Scientific Programmes Unit, 1976. 60 p.

Contamination, Marine environment, *South Africa, Sampling, Distribution

Summary not available. [possibly oil pollution related]

[from Marine Pollution Research Titles 4(4):#617. 1977]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0169
OUTER CONTINENTAL SHELF OIL SPILL IMPACT ON SOUTHERN CALIFORNIA RESOURCES
Cooke, T.S. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 257. Abstract. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Sources, Oil spills, Models, OCS, California, Spill trajectories, Environmental effects, *Analytical methodology

Sources of existing and potential oil pollution in the Southern California Bight region are presented. Key resources are identified, probable spill trajectories are discussed, and a methodology for analyzing a spill impact is examined.

79A-0170
PETROLEUM POLLUTION OF THE SEAS
Gerard, F. 1977.
Met-Mar, Vol 95:27-39.

Chemical analysis, Pollution control, Contaminants, Oil removal

Summary not available.

[from Underwater Information Bulletin 10(1):#7808/1380. 1978]

79A-0171
OIL IN THE SEA: HOW LITTLE WE KNOW
Graham, F., Jr. 1978.
Audubon 80(6):133-147.

Marine environment, Marine organisms, Fish, Birds, Contamination, Oil spills, Offshore development, Biological effects, Reproduction, OCS, Arctic, *Review

A thorough overview of the problem of evaluating the effects of oil pollution on the marine environment is presented. Many key topics are discussed, including: 1) Methodological advances in the scientific assessment of the impact of oil from spills and other sources on marine ecosystems; 2) results of numerous studies on the effects of oil on marine organisms; 3) the changing viewpoint of the scientific community regarding the seriousness of the problem of marine oil pollution as more precise data become available; and 4) environmental threats created by offshore development, particularly in the OCS of eastern North America and the Canadian Arctic where cooperation between the Canadian government and the oil industry has resulted in badly planned offshore drilling.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0172
TOPICS AND TERMS IN ENVIRONMENTAL PROBLEMS
Holum, J.R. 1977.
New York, John Wiley & Sons, 1977. x + 729 p.

Environmental effects, Oil spills, Offshore development, Pipelines

This book consists of 239 main entries covering topics of environmental concern. Each entry includes a general explanation and discussion of the topic and various environmental problems associated with it, as well as a list of selected references. Entries relevant to oil pollution include oil spills, petroleum, water pollution, and the Alaskan pipeline.

79A-0173
OIL POLLUTION OF THE SEAS: THE ENVIRONMENTAL CONSEQUENCES
Marsden, P.S.S.F., and K. Taylor. 1977.
Technology Assessment and the Oceans. P.D. Wilmot and A. Slingerland (eds.). Boulder, Colorado, Westview Press, Inc., 1977. p. 147-151. Proceedings of the International Conference on Technology Assessment, Monaco, 26-30 October 1975. (ISTA Documentation series No. 1.)

Environmental effects, Sources, Oil discharges, Chronic effects, Birds, Marine environment, Estuaries, Fisheries, Coastal waters, *Seabirds

The environmental effects of oil pollution in the marine environment are reviewed. The sources and quantities of oil discharges are tabulated, and the effects of oil discharges and chronic pollution in coastal waters, harbors, estuaries and the open sea are considered. The authors' general conclusions are that, with the exception of localized damage to seabird populations, there have been no observed effects upon the ecology of the open oceans, that oil spills and intentional tanker discharges have resulted in little or minor damage to fisheries; and that severe chronic pollution has resulted in long-lasting damage to marine and saltmarsh habitats and limited tainting effects on some fishery resources.

79A-0174
MARINE AND ESTUARINE POLLUTION
Reish, D.J., T.J. Kauwling, A.J. Mearns, S.S. Rossi, and F.G. Wilkes. 1978.
Journal Water Pollution Control Federation 50(6):1424-1469.

Bibliographies, Estuaries, Oceans, Biological effects, Fate, Marine organisms, *Literature review

This literature review of marine and estuarine pollution includes a section on oil pollution which cites 87 scientific and technical articles published in 1976-1977.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-0175
THE IMPACT OF THE SANSINENA EXPLOSION AND BUNKER C SPILL ON THE MARINE ENVIRONMENT OF OUTER LOS ANGELES HARBOR
Soule, D.F., and M. Oguri (eds.). 1978.
Los Angeles, University of Southern California, Institute for Marine and Coastal Studies, 1978. 258 p. Marine Studies of San Pedro Bay, California. Part 15.

Tankers, Sansinena spill, Biological effects, Physical effects, Harbors, California, Baseline studies, Fuel oil, Marine environment

The tanker Sansinena exploded in outer Los Angeles Harbor on December 17, 1976, resulting in the spill of a large amount of Bunker C fuel oil into the water. "For the first time such an incident occurred where there was an extensive biological baseline, so that scientists were able to follow the fate of the fuel in the water column and determine the impact on the marine biota." Discussed in detail are the physical, biological, and other effects of the Sansinena incident, a review of the effects of spilled Bunker C fuel on marine environments, and a review of oil, fisheries, and the health of the ecosystem.

D. FATE OF OIL IN THE ENVIRONMENT

1. Biodegradation

79A-0176
MICROBIOLOGICAL ASPECTS OF POLLUTION CONTROL [book review]
Author unknown. 1978.
Water Pollution Control 77(3):215.

Biodegradation, Pollution control, Microorganisms, Oil spills, Book review

A review is given of the title book [R.K. Dart, and R.J. Stretton (eds.). Amsterdam, Elsevier Scientific Publishing Co., 1977. 215 p.]. The chapter entitled "Biodegradation" includes a discussion of biodegradation of oil spills in the marine environment.

79A-0177
STIMULATION OF LIPASE PRODUCTION DURING BACTERIAL GROWTH ON ALKANES
Breuil, C., D.B. Shindler, J.S. Sijher, and D.J. Kushner. 1978.
Journal of Bacteriology 133(2):601-606.

Biodegration, Bacteria, Microorganisms, Hydrocarbons, Crude oil, *Alkanes, *Lipase activity, *Acinetobacter lwoffi

Growth of Acinetobacter lwoffi on crude oil and several alkanes was tested. Growth occurred on most alkanes at 20° C, but on only a few at 30° C after a longer lag than at 20° C. High levels of cell-bound lipase were found in cultures in which alkanes were the sole C source. This and previous work have indicated that alkane degradation may be correlated with lipase formation.

[from Biological Abstracts 65(11):#67004. 1978]

79A-0178
MICROBIAL DEGRADATION OF PETROLEUM IN THE MARINE ENVIRONMENT
Colwell, R.R. 1977.
Annual Report UM/ONR-4, Contract N00014-75-C-0340 P00003, Task NR 133-081. 21 p. Annual Report submitted to Office of Naval Research, January 1, 1977-December 31, 1977.

Biodegradation, Aromatic hydrocarbons, Environmental effects, Microorganisms, *Naphthalene

Research focussed on biodegradation and biodeterioration of naphthalene and naphthalene creosote-treated wood at the US Naval Station in Roosevelt Roads, Puerto Rico. Preliminary results are given for work done on environmental effects of naphthalene and naphthalene-treated wood at the microbial level, biodegradation of treated and untreated wood exposed to water and sediment, and the effect of naphthalene and naphthalene/creosote on the commensal flora of wood-boring organisms. Also considered was the role of petroleum in enhancing or inhibiting the biodeterioration of treated and untreated pilings.

D. FATE OF OIL IN THE ENVIRONMENT

79A-0179
THE BIODEGRADATION OF OIL SLUDGE IN SOIL
Dibble, J.T., and R. Bartha. 1978.
American Society for Microbiology Annual Meeting, 78th, 1978. Paper No. Q71. Abstract.

Biodegradation, Land farming, Sludge, Soil, Waste disposal, Storage, Refineries

Parameters affecting the biodegradation of oil sludge in soil were studied in order to develop optimal management practices for disposal of oil storage and refinery wastes. "As determined by respirometry and residue analysis, the highest rate and extent of oil sludge biodegradation was found to occur in soil at a slightly alkaline reaction and mesophilic temperature." By dividing the maximum useful loading rate of 10% w/w per year into four separate applications per growing season, the extent of biodegradation was doubled.

79A-0180
MICROBIAL TRANSFORMATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN PRISTINE AND PETROLEUM-CONTAMINATED SEDIMENTS
Herbes, S.E., and L.R. Schwall. 1978.
Applied and Environmental Microbiology 35(2):306-316.

Biodegradation, Microorganisms, PAH, Hydrocarbons, Aromatic hydrocarbons, Contamination, Sediments, Freshwater, *Transformation rates

The title study was performed by incubating ^{14}C-labeled PAHs with sediment samples from a hydrocarbon-contaminated and an uncontaminated stream and measuring evolution of $^{14}CO_2$, polar metabolic intermediate compounds in sediment extracts, and cell-bound ^{14}C in sediment residue. Turnover times ranged from 7.1 hrs. to 30,000 hrs. in contaminated sediment, and were 10-400 times greater in uncontaminated sediment. Results indicate that while 2- and 3-ring PAHs may be fairly easily transformed, larger compounds are transformed at very slow rates and may persist even in chronically contaminated sediments for long periods of time.

79A-0181
MICROBIOLOGICAL ASPECTS OF POLLUTION CONTROL [book review]
Jenkins, S.H. 1978.
Water Research 12(7):503.

Biodegradation, Pollution control, Biological effects, Microorganisms, Book review

Among aspects of the title book by R.K. Dart and R.J. Stretton [Elsevier, 1977. 216 p.] which the reviewer criticized was the briefness of the chapter on oil pollution. However, he favorably comments on the general organization of the book, stating that each chapter is complete in itself and is well documented.

D. FATE OF OIL IN THE ENVIRONMENT

79A-0182
MICROBIAL DEGRADATION OF THE WATER-SOLUBLE FRACTION OF GAS OIL - I
Kappeler, T., and K. Wuhrmann. 1978.
Water Research 12(5):327-334.

Biodegradation, Microorganisms, Hydrocarbons, Fate, Soil, Groundwater, Chemical analysis, WSF, Fuel oil

An oil spill on sandy soil may create a body of contaminated underground material from which the WSF may dissolve into percolating rain water. This article describes experiments set up to measure the aerobic microbial degradation of hydrocarbons in such an aqueous percolate. At the experimental infiltration rates, with mixed autochthonous flora in clean ground water as the inoculum, "complete hydrocarbon elimination within a few decimeters of percolation depth occurred when steady state conditions of the microbial settlement of the sand were established."

79A-0183
MICROBIAL DEGRADATION OF THE WATER-SOLUBLE FRACTION OF GAS OIL - II
BIOASSAYS WITH PURE STRAINS
Kappeler, T., and K. Wuhrmann. 1978.
Water Research 12(5):335-342.

Biodegradation, Microorganisms, Bacteria, Aromatic hydrocarbons, Bioassay, Metabolism, Groundwater, WSF, Fuel oil

The rates and possible pathways of the breakdown of water-soluble aromatic compounds by the mixed autochthonous microflora of clean ground water as well as by individual bacterial strains are described. Since only 4 different degradation spectra were found, it was concluded that only 4 metabolically different strains were present in a group of 12 active isolates. Some of the primary reactions of the oxidative degradation of aromatic components of gas oil were elucidated by the identification of intermediate metabolic products. "Available nitrogen and dissolved oxygen are limiting factors in the microbial purification of hydrogen-contaminated ground water."

79A-0184
USE OF AN INTERNAL STANDARD IN MONITORING THE BACTERIAL DEGRADATION OF CRUDE OIL
Mrsny, R., R.W. Barles, D. Chin, K.C. Enwold, et al. 1978.
Applied and Environmental Microbiology 36(5):776-779.

Biodegradation, Bacteria, Microorganisms, Crude oil, *Culture techniques, *Standard, *Hexachloroethane

Because of its biological inertness, nonvolatility, and insolubility in water, hexachloroethane was demonstrated in this experiment to be a suitable standard against which the rate of biodegradation of crude oil components can be measured.

D. FATE OF OIL IN THE ENVIRONMENT

79A-0185

DISTRIBUTION OF HYDROCARBON-UTILIZING MICROORGANISMS AND HYDROCARBON BIODEGRADATION POTENTIALS IN ALASKAN CONTINENTAL SHELF AREAS

Roubal, G., and R.M. Atlas. 1978.
Applied and Environmental Microbiology 35(5):897-905.

Biodegradation, Microorganisms, Hydrocarbons, Distribution, Baseline studies, *Biodegradation potential, OCS, Alaska, Gulf of Alaska, Beaufort Sea

A survey was undertaken of the distribution of hydrocarbon-degrading microorganisms in areas of the Beaufort Sea and Gulf of Alaska where development of offshore oil resources is likely, and of the potential for biodegradation of petroleum pollutants in these areas. Numbers of microorganisms and biodegradation potentials exhibited seasonal variations and were not correlated. A positive correlation did exist in Cook Inlet between the distribution of hydrocarbon utilizers and the presence of hydrocarbons in the environment. Non-nutrient-limited biodegradation potentials were also studied and are compared to the natural biodegradation potentials measured in Cook Inlet.

79A-0186

BIODEGRADATION OF SUBMERGED CRUDE OIL USING THE HYDROLAB HABITAT

Scanland, T.B. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 271-279. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Biodegradation, Crude oil, Sampling, Sediments, Fate, Bahamas

Results of the title experiment demonstrated marked biodegradation of the sample hydrocarbons in the range of C_8 to C_{12} compared to the original Kuwait oil from which the samples were derived. Due to the presence of the crude oil some evidence of mortality on the ocean bottom was observed, but overall biological respiration rates were not significantly reduced.

79A-0187

GROWTH OF PROTOTHECA ISOLATES ON N-HEXADECANE AND MIXED HYDROCARBON SUBSTRATE

Walker, J.D., and R.S. Pore. 1978.
Applied and Environmental Microbiology 35(4):694-697.

Biodegradation, Microorganisms, Algae, Hydrocarbons, **Prototheca*, *Hydrocarbon utilization

Prototheca isolates were tested for their ability to grow on the title substrates. Hydrocarbon utilization was found to be correlated to species type and not to the source of isolation. The proportions of

P. zopfii isolates that utilized hydrocarbons were approximately the same (70-80%) for cultures from different isolation sources (sewage, slime flux, and disease tissue). P. wickerhamii was recovered from the same source as P. zopfii but did not have the ability to utilize hydrocarbons. [possibly oil pollution related]

2. Physical and Chemical Processes

79A-0188
MIGRATION OF AND CHANGES IN HYDROCARBON POLLUTION OF THE ALLUVIAL NAPPE OF THE SEINE, AT ROUEN, UPPER NORMANDY (FRANCE) [in French]
Conrad, G., A. Delepoulle, and M.S. Roudesli. 1977.
Protection des Eaux Souterraines Captees pour l'Alimentation Humaine, Communications, Colloque National, Orleans-la-Source, France, 1-2 March 1977. France, Service Geologique National, 1977. p. 129-141.

Fuel oil, Contamination, Groundwater, Rivers, Oils spills, Fate, France

An 800 m^3 domestic fuel oil spill in 1973 in the title area has now penetrated into the aquifer feeding the Seine. Studies indicated a mild pollution generally of the subterranean waters in the industrial zone of Rouen.

[from Chemical Abstracts 89(10):#79934b. 1978]

79A-0189
CHEMICAL STUDIES OF OFFSHORE OIL PLATFORMS IN THE SANTA BARBARA CHANNEL
McDermott-Ehrlich, D., D.R. Young, G.V. Alexander, T.-K. Jan, and G.P. Hershelman. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 133-144. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Platforms, Chemical analysis, Hydrocarbons, Fate, Distribution, Sampling, Fish, Santa Barbara Channel, California

Field surveys were conducted to document the diversity, health, and abundance of marine life in the proximity of oil platforms Hazel and Hilda in the title area. Sediment samples were analyzed for their hexane extractable materials, volatile solids, copper, zinc, and petroleum hydrocarbon content. The levels of the first four items appeared normal in most samples; however, they were higher directly below the platforms. The petroleum hydrocarbon content of all samples exceeded those levels from control sites. Tissues of two fish species were also analyzed.

D. FATE OF OIL IN THE ENVIRONMENT

3. Models, Simulations, and Predictions

79A-0190
SPILL SCENARIOS BEGUN FOR PRUDHOE BAY OFFSHORE OIL FIELDS
Anon. 1978.
Sea Technology 19(11):50.

Models, Fate, Behavior, Oil slicks, Arctic, Ice, Prudhoe Bay, Alaska, Offshore development, NOAA, *OCSEAP

Laboratory tests to determine transport mechanisms and behavior of oil in and under sea ice will provide data for the development of models of ice behavior and of spill scenarios for the title locality. This study is part of the NOAA/Bureau of Land Management Outer Continental Shelf Environmental Assessment Program (OCSEAP).

79A-0191
MODELLING THE EVOLUTION OF PATCHES OF POLLUTANTS IN THE SOUTHERN NORTH SEA
Adam, Y. 1977.
Applied Mathematical Modelling 1(4):170-176.

Models, Prediction, Dispersion, Fate, North Sea

"The assumptions used in the construction of a mathematical dispersion model amenable to digital simulation are stated, and the numerical method of simulation is sketched. The computer programs and special algorithms are described. Results from several simulations of actual dumpings and from theoretical situations are presented."

79A-0192
A METHODOLOGY TO AID SYNTHESIS OF INFORMATION FROM MULTIDISCIPLINARY ECOLOGICAL FIELD STUDIES ON PETROLEUM FATE AND EFFECTS
Appan, S.G., and I.A. Miller. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 55-66. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Models. Information systems, *Computer-assisted methodologies

An integrated system of computer-assisted methodologies for effective scientist-controlled analysis, interpretation, and display of ecological data is described. The system was tested using data from multidisciplinary petroleum fate and effects study carried out in the Louisiana oil patch.

D. FATE OF OIL IN THE ENVIRONMENT

79A-0193

SURFACE DRIFTER MOVEMENTS OBSERVED IN OUTER STRAIT OF JUAN DE FUCA, JULY 1977

Ebbesmeyer, C.C., J.M. Helseth, and J.M. Cox. 1977.
NOAA Technical Memorandum ERL MESA-22. 22 p.

Drift, Movement, Behavior, Oil slicks, Models, Prediction, Fate, Strait of Magellan

Intended as an observational summary, this report describes an experiment involving 77 thin, floatable drifters (1.3 x 1.3 x 0.0032 m) launched at 0.4-1.6 km (0.25-1 mi) intervals cross channel from Pillar Point in the title area. The experiment had 2 purposes: to observe movements of the drifters which approximate movements of potential oil slicks, and to make surface current measurements for comparison with observations from moored instruments deployed by Pacific Marine Environmental Laboratory.

79A-0194

ALONG-SHORE COHERENCE OF WINDS ALONG THE NORTH ALASKAN COAST FOR OIL SPILL ANALYSIS

Hufford, G.L., J.P. Welsh, I.M. Lissauer, and B.D. Thompson. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 3:529-532. Paper OTC 2947.

Movement, Dispersion, Oil spills, Models, Fate, Spill trajectories, Coastal waters, Alaska, Predictions, *Wind fields

An understanding of regional wind fields is necessary for forecasting the movement and dispersal of an oil spill along the Alaskan North Slope coast. An analysis of available meteorologic data from Point Barrows to Barter Island suggests the presence of three wind regimes: a western, central, and eastern regime. Knowledge of these three regimes helps to provide a preliminary means of predicting oil spill trajectories until more data of the coastal currents becomes available.

79A-0195

MODELING OF OIL SPILL TRAJECTORIES USING SEQUENTIAL SATELLITE IMAGERY

McLeod, W.R., J.H. Kennedy, and D.T. Hodder. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 1:319-324. Paper OTC 2764.

Models, Oil slicks, Remote sensing, Spill trajectories, *Landsat data

"In Gulf of Alaska waters, eddy patterns appear in enhanced LANDSAT imagery and are stable for months. The eddy patterns themselves extend some 50 miles offshore, and show surface drift complexity, not predicted by present models. These results lead us to alternative ideas of how to predict spill trajectories in a quasi empirical way using satellite data. This detailed level of information is required if one is to control spills on a lease block or platform basis."

D. FATE OF OIL IN THE ENVIRONMENT

4. General Fate of Oil

79A-0196
HYDROCARBONS IN OPEN OCEAN WATERS
Brown, R.A., and H.L. Huffman, Jr. 1978.
Washington, DC, National Science Foundation, Office for the International Decade of Ocean Exploration, 1976. 5 p.

Hydrocarbons, Aromatic hydrocarbons, Fate, Evaporation, Biodegradation, Weathering, Absorption, Oceans, *Pelagic waters

Nonvolatile hydrocarbons appear to persist in open oceans to varying degrees, the cycloparaffins and the isoparaffins being most persistent. The aromatics appear to be selectively removed from ocean water. Evaporation and dissolution may account for loss of some of the C_{10} and lighter aromatics. Other processes, such as chemical or biological degradation and absorption by particulate matter, may be responsible for removal of C_{14} and heavier aromatics.

79A-0197
OIL IN MARINE WATERS
Frey, M.G. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 1:227-230. Paper OTC 2752.

Fate, Natural seepage, Biodegradation, Offshore production, Oil transport, Petroleum products, Oil discharges

Oil has entered the marine environment for millions of years through natural seepage; natural processes of biodegradation have eliminated this oil. "It has been only since man has accidentally dumped enormous amounts of unnatural oil - refined products that real problems have developed.... The [oil] industry has maintained a remarkable record in its offshore exploration and production program, contributing less than 1 1/2 percent of the petroleum in marine waters."

79A-0198
INVENTORY, DISTRIBUTION AND ORIGIN OF ALIPHATIC AND POLYAROMATIC HYDROCARBONS IN SEA WATER, THE SURFACE MICROLAYER AND THE AEROSOLS IN THE TROPICAL EASTERN ATLANTIC [in French]
Marty, J.C., A. Saliot, and M.J. Tissier. 1978.
Comptes Rendus Hebdomadaires des Seances de l'Academie de Sciences, Serie D 286(11):833-836.

Oceans, Distribution, Hydrocarbons, PAH, Aromatic hydrocarbons, Sources, GC/MS

D. FATE OF OIL IN THE ENVIRONMENT

Computerized GC/MS was used for the title analysis. "The hydrocarbon pattern shows that, superimposed on the typical marine components, a contribution from smokes of natural and industrial origin and/or from pollution associated with crude oil sea slicks is present."

[from Chemical Abstracts 89(12):#94766s. 1978]

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT, AND PRODUCTION

1. Biological Aspects

79A-0199
COMPARISONS OF FOULING COMMUNITY BIOMASS ON OFFSHORE OIL FIELD STRUCTURES IN THE GULF OF MEXICO WITH EMPHASIS ON APPARENT EFFECTS OF PRODUCED WATER DISCHARGE
Gallaway, B.J., L.R. Martin, R. Howard, and M.F. Johnson. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 117-129. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Platforms, Sampling, Biomass, Distribution, Wastewaters, Oil fields, Gulf of Mexico, *Biofouling

The title study was conducted by the NMFS (National Marine Fisheries Service) in the Buccaneer Oil Field offshore Galveston, Texas. Samples were taken at 3 depths on 2 legs of 3 types of offshore oil field structures. The sampling array was designed to provide comparisons of total biomass and species diversity of organisms colonizing platforms characterized by: produced water discharges (from a production platform); heated seawater and treated sewage discharges (from a quarters platform); and platforms without discharges (from a satellite well jacket). Diversity was highest on the satellite platform, lowest on the production platform, and intermediate on the quarters platform.

79A-0200
OUTER CONTINENTAL SHELF DEVELOPMENT IN THE SANTA BARBARA CHANNEL: LACK OF DETECTABLE IMPACT ON FISHERIES
Hester, F.J. 1977.
Offshore Technology Conference, 9th Houston, Texas, 1977. Vol 1:261-268. Paper OTC 2756.

Biological effects, Fish, Fisheries, OCS, Offshore development, Santa Barbara Channel

"This paper examines sport and commercial fish catch in the Santa Barbara Channel over a 20 year period to attempt to detect possible changes in catch that might be associated with OCS activity in the area during that same period. Such changes were not found, indicating that the effects of OCS activities were nonexistent or minor compared to natural changes in the ocean climate or to fishing pressure on the resources themselves."

2. Physical and Chemical Aspects

79A-0201
NO WATER-SOURCE DAMAGE FOUND IN OIL STATES [news brief]
Anon. 1978.
Oil and Gas Journal 76(35):52.

Drilling, Inland, US, Groundwater, Monitoring, *Aquifers, Environmental effects, *Salt water injection operations

Independent studies sponsored by the Interstate Oil Compact Commission indicated that oil and gas operations in some of the biggest US producing states have not damaged underground sources of drinking water. The studies entailed the monitoring of wells in major aquifers in Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. A recently presented report stated that "no pollution can be attributed to oil and gas field salt water injection operations in the area monitored." [possibly oil pollution related]

79A-0202
DEEP DRILLING OPERATIONS PROTECT SENSITIVE ENVIRONMENT
Barnaba, P.F., and G. Dossena. 1978.
Oil and Gas Journal 76(41):73-74, 79-80.

Environmental protection, Drilling, Inland, Groundwater, *Aquifers, Pollution prevention

Protection of the surficial and subsurface environment is a major concern in inland exploratory and production drilling. This article describes the precautionary measures taken in preparing and constructing a drill site, so that drilling muds, oily sludges and contaminated production waters do not pollute drinking water, groundwater and aquifers.

79A-0203
CHEMISTRY OF MARINE SEDIMENTS [book review]
Farrington, J.W. 1978.
Geochimica et Cosmochimica Acta 42(1):151.

Chemical analysis, Sediments, Marine environment, Offshore production, Book review

The title book [T.F. Yen (ed.). Ann Arbor, Michigan, Ann Arbor Science Publishers, 1977. 265 p.] is critically reviewed. Several papers are considered timely and well written, including the paper "Characterization of Sediments in the Vicinity of Offshore Petroleum Production" by R.M. Bean, et al., but in general the book "falls far short of" the comprehensive coverage indicated in the book jacket leaf.

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT, AND PRODUCTION

79A-0204
EVALUATION OF GEOLOGIC HAZARDS IN OCS PETROLEUM LEASE AREAS, SOUTHERN CALIFORNIA BORDERLAND
Field, M.E., S.H. Clarke, Jr., and H.G. Greene. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 1:69-78. Paper OTC 2736.

OCS, California, Santa Barbara Channel, Oil-gas leasing, USGS, *Geologic hazards

Major objectives of current USGS studies of potential OCS lease areas between Point Conception and the Mexican border include the identification and characterization of geologic phenomena that might constitute hazards to petroleum exploration and development. This paper briefly discusses seismicity and faulting, sea-floor instability, and natural seeps. Seismic activity appears to be greatest in the eastern Santa Barbara Channel and the San Pedro shelf. Sea floor instability and downslope mass movement occur under conditions common to, and noted in, virtually all parts of the Southern California OCS. Oil and gas seeps are most numerous on the mainland shelf of the Santa Barbara Channel, as well as the Santa Monica shelf.

3. Social and Economic Aspects

79A-0205
COMPUTER EVALUATES COST OF NORTH SEA BLOWOUT OIL SPILL
Anon. 1978.
Ocean Industry 13(6):96-101.

Models, Oil spills, Movement, Cost analysis, North Sea, *Computer simulation

Based on a computer simulation program (SLIKTRAK) developed by Shell International Petroleum Mij (SIPM), the estimated cost of an average oil spill resulting from a North Sea well blowout is $6 million. This article discusses the types of input data that were incorporated in the model and the likely costs of well blowouts, using different scenarios.

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT, AND PRODUCTION

79A-0206
GULF CANADA SPENDS MILLIONS FOR ENVIRONMENTAL PROTECTION [news brief]
Anon. 1978.
Journal of Canadian Petroleum Technology 17(2):110.

Oil industry, Environmental protection, Pollution control, Economics, Exploration, Production, Refining

The title company's environmentally related capital expenditures rose from $14 million in 1975 to $25 million in 1977. Exploration and production activities accounted for $14.5 million, and refining activities for $6.4 million, of the 1977 expenditures.

79A-0207
PETROCHEMICALS EFFLUENT TREATMENT [news brief]
Anon. 1978.
Effluent and Water Treatment Journal 18(1):14.

Petrochemicals, Industries, Economics, Wastewater treatment, Europe

A report by the petrochemicals/ecology group of the European Chemical Industry Federation (CEFIC) indicates that the petrochemicals industry may need to spend up to 13% of its total planned investments on wastewater treatment facilities, depending on size of the site and degree of purification required.

79A-0208
U.S. OIL'S 1977 ENVIRONMENTAL SPENDING TOPS $2.5 BILLION [news brief]
Anon. 1978.
Oil and Gas Journal 76(47):48.

Economics, Refineries, Environmental protection, Cost analysis, API, Pollution prevention, Pollution control, Fate, Environmental effects

In 1977, the US petroleum industry spent over $2.5 billion, based on a survey response representing about 80% of the US refining capacity. In addition, API spent over $5.5 million on environmental research projects, which included identification, measurement, and control of toxic pollutants in industrial effluents, prevention and control of hazardous substance spills, and the fate and effects of oil in offshore and freshwater areas.

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT, AND PRODUCTION

79A-0209
THE MARINE MODE: OIL, GAS AND ARCTIC SHIPPING
Dosman, E.J. 1978.
Alternatives: Perspectives on Society and Environment 7(3):17-25.

Oil transport, Oil industry, Development, Exploration, Foreign governments, Economics, Socioeconomic effects, Environmental effects, Tankers, Ice, Beaufort Sea, Arctic, Canada

Socioeconomic problems associated with gas and oil exploration, development, and transport in the Beaufort Sea and Mackenzie Delta are examined primarily from the perspective of Canadian government-industry interaction. Potential environmental hazards arising out of heavy maritime traffic, particularly oil tanker traffic, in ice-covered waters are briefly considered.

79A-0210
GREENLAND'S DILEMMA [editorial]
Polunin, N. 1977.
Environmental Conservation 4(4):242.

Offshore exploration, Offshore drilling, Greenland, Socioeconomic effects, Fisheries, Environmental effects, *European Economic Community

This editorial discusses the opposition of native Greenlanders to oil exploration and extraction off Greenland's west coast. Contributing to the opposition is the fear that a major tanker accident or oil spill would severely damage seals and fish breeding grounds off the coast. The author urges that when Greenland passes from Danish to home rule in the spring of 1979, the native Greenlanders resist "temptations to relax controls and indulge in short-term, once-for-all financial gains to the detriment of renewable natural resources in the form of marine life which should be permanently conserved."

4. Legal and Regulatory Aspects

79A-0211
BAN ON OIL DEVELOPMENT OF ALASKAN LANDS EXTENDED [news brief]
Anon. 1978.
Oil and Gas Journal 76(48):28.

Inland, Development, EIS, Alaska, US government, *Development ban

A ban on oil and minerals development has been extended for another 3 years on about 110 million acres of Alaskan federal lands. After a comment period and completion of a draft environmental statement, the long-range status of these lands will be decided by federal authorities.

79A-0212
DAMAGE LIABILITY TO APPLY TO ALL OCS LEASES [news brief]
Anon. 1978.
Oil and Gas Journal 76(13):85.

Liability, Compensation, OCS, Oil-gas leasing, Legislation, Fisheries, *Oil spill fund

"Provisions requiring operators to pay for damage resulting from oil spills and fouling of fishing gear will apply to all present and future federal leases on the US Continental Shelf." These provisions are part of two OCS amendment bills which have passed both houses of Congress and are awaiting further action. Both bills would levy a fee of up to 3¢/bbl on OCS oil production to support an oil spill fund of up to $300 million.

79A-0213
EPA SETS UP NEW OCEANS BRANCH [news brief]
Anon. 1978.
Sea Technology 19(8):55.

EPA, Extraction, Oceans, Resource management, Government agencies

The new Ocean Programs Branch within EPA's Office of Water and Hazardous Materials will oversee ocean programs relating to oil and gas extraction. The new branch, along with the Marine Protection and Spill Prevention and Control Branches, makes up the Oil and Special Materials Control Division.

79A-0214
LEASE-SALE CANCELLATION SIGNALS DEEPER PROBLEM [editorial]
Anon. 1978.
Oil and Gas Journal 76(6):17.

OCS, Offshore development, Oil-gas leasing, Oil industry, EIS, US government, Georges Bank, *Lease-sale cancellation

An oil industry viewpoint on cancellation of the Georges Bank lease sale in late January 1978 is presented. According to this editorial, the National Environmental Policy Act of 1969 has become a main weapon against development, wielded by environmentalists and the fisheries industry when its original purpose was to be a solution to federal-state environmental disputes.

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT, AND PRODUCTION

79A-0215
UNNECESSARY REGULATIONS DELAY EXPLORATION PROGRAMS [editorial]
Anon. 1978.
Offshore 38(6):25.

Regulations, US government, EIS, Offshore exploration, Offshore drilling, Offshore production

According to this editorial statement, new federal regulations published in the Federal Register, January 1978, are yet another roadblock to resuming offshore drilling operations after a year of delays. "Before any exploratory operation can begin, the undrilled block has to be the subject of a new environmental study and report...[and] operators must submit separate plans for offshore exploration and production." These new procedures will cause delays, add to the expense of exploration programs, force drilling in less desirable tracts, and prevent use of rigs already under contract.

79A-0216
DECISION TIME FOR THE COASTAL ZONE
Atkin, D. 1977.
Underwater Naturalist 10(4):4-8.

Offshore drilling, Offshore development, Onshore impacts, Coastal zone management, Regulations, *Planning

Offshore oil drilling is briefly mentioned as one of the activities whose impacts must be evaluated in the planning process mandated by the federal Coastal Zone Management Act of 1972. [possibly oil pollution related]

79A-0217
ALASKAN OIL: A CASE HISTORY OF CONFUSION
Bright, D.B. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 233-242. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Alaska, Oil terminals, Oil transport, Oil industry, Pipelines, Regulations, Social effects, *Public action

The major participant in the Trans-Alaska Pipeline System (TAPS), Standard Oil, Ohio (SOHIO), faced numerous problems and delays in the process of seeking approval for the construction of a marine terminal and related pipeline system to service Gulf Coast and Midwest states. Problems generated from this project indicate that: Public concern about oil spills will result in more restrictive regulatory processes; no strong national energy policy will evolve; public participation as part of the decision process will become increasingly significant; and the energy issue will continue to stress existing state and federal processes.

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT, AND PRODUCTION

5. General Aspects

79A-0218
OCS PRODUCTION DUE ENVIRONMENTAL STUDY [news brief]
Anon. 1978.
Oil and Gas Journal 76(16):59.

OCS, Offshore exploration, Offshore production, Platforms, BLM, Environmental effects, Gulf of Mexico

The US Bureau of Land Management has contracted the Southwest Research Institute (SRI) of Houston to study the effects of petroleum production on the Gulf of Mexico offshore environment. SRI has chosen four offshore blocks with production platforms for detailed study; sixteen secondary production sites and four tracts with no exploration activity will also be studied.

79A-0219
PRODUCERS BACK BRINE DISPOSAL POLICY
Anon. 1978.
Petroleum Engineer International 50(11):14.

Drilling, Offshore production, Texas, Environmental effects, *Brine disposal policy

Coastal and offshore Texas oil and gas producers have endorsed a Texas Railroad Commission policy of reviewing applications for allowing discharges of production brines into state waters. The endorsement is based on oil industry past operational experience that reflected 1) no documented harm to marine waters by discharge of brines containing less than 100 ppm oil, and 2) no documented harm to receiving body of water caused by normal discharge of drill cuttings, drilling fluids, or treatment fluids free of oil.

79A-0220
ACCIDENTS AND UNSCHEDULED EVENTS ASSOCIATED WITH NON-NUCLEAR ENERGY RESOURCES AND TECHNOLOGY
Bliss, C., P. Clifford, G. Goldgraben, E. Graf-Webster, and
K. Krickenberger. 1977.
Report EPA/600/7-77/016, M76-68. 293 p.

Oil industry, Oil shale, *Accidents, *Energy systems

"Accidents and unscheduled events associated with non-nuclear energy resources and technology are identified for each step in the energy cycle. Both natural and anthropogenic causes of accidents or unscheduled events are considered. Data concerning these accidents are summarized. Estimates of frequency and severity are presented for all accidents."

The systems discussed include oil and oil shale as well as other energy sources. [possibly oil pollution related]

[from Petroleum Abstracts 17(52):#242,701. 1977]

79A-0221
THE ENVIRONMENTAL IMPACT OF DISCHARGING DRILLING FLUIDS, COOK INLET, ALASKA
Charlton, D., C.P. Falls, R.C. Miller, J.P. Houghton, and D.L. Beyer. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 193. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Drilling, Biological effects, Physical effects, Bioassay, Sampling, Alaska, Distribution, Marine organisms

A study of biological and physical effects of discharging drilling fluids into the marine environment was conducted in the title area. Discharged drilling fluids are composed of cuttings and drilling mud. Results are given of bioassay studies using various organisms, turbulence measurements, and cuttings distribution measurements.

79A-0222
OIL BIBLIOGRAPHY
Dunphy, E. (ed.). 1977.
Aberdeen, Scotland, ANSLICS Library, Robert Gordon Institute of Technology, 1977. 314 p.

Bibliographies, UK, North Sea, Offshore development, Onshore impacts, Environmental effects, *Scotland libraries

This 3rd edition of the title bibliography, compiled by the Aberdeen and North of Scotland Library and Information Cooperative Service (ANSLICS), lists publications related to the oil industry which are available in Scotland libraries. Emphasis is on North Sea operations and their onshore and offshore effects. Environmental and pollution related publications are included. Information is available from the ANSLICS Library, Robert Gordon Institute of Technology, St. Andrew St., Aberdeen, ABI 1HG, Scotland.

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT, AND PRODUCTION

79A-0223
PARTICIPATION OF ERDA IN THE TRANSPORT AND ECOLOGICAL EFFECTS CATEGORIES OF THE PASS-THROUGH PROGRAM
Franklin, R.E., D.S. Ballantine, J.O. Blanton, D.H. Hamilton, and C.M. White. 1976.
Report EPA 600/7-76-002. p. 106-119.

ERDA, Government agencies, Offshore development, Alaska, Environmental effects, *Environmental research programs, *Pass-through program

Descriptions are given of several interagency environmental research programs implemented by ERDA with funds from the pass-through program. Included are projects on offshore oil extraction and Alaskan oil.

[from Petroleum Abstracts 17(52):#242,734. 1977]

79A-0224
ECOLOGICAL IMPACT OF EXPLORATORY DRILLING: A CASE STUDY
Gettleson, D.A. 1978.
Energy/Environment '78. J. Lindstedt-Siva (ed.). Society of Petroleum Industry Biologists, 1978. p. 93-115. Proceedings of a Symposium on Energy Development Impacts, Los Angeles, 22-24 August 1978.

Monitoring, Drilling, Exploration, Environmental effects, Distribution, OCS, Gulf of Mexico, Coral reefs

An environmental monitoring program of the drilling of two exploratory wells was conducted on the OCS of the northwest Gulf of Mexico. The spatial distribution of discharged drilling fluids and cuttings was studied, and the apparent health of the reefbuilding corals in the vicinity was assessed. Results demonstrate a portion of the drilling fluids and cuttings were distributed more than 1000 m from the drill site; however, none were detected at the monitored sites within the Coral Reef Zone.

79A-0225
OIL PROTECTION IN THE NORTH SEA
Hammel, B. 1977.
Marine Engineers Review, Vol. 6:37-39.

Risk analysis, Offshore development, Blowouts, Economic effects, Environmental effects, Spill cleanup, Equipment, North Sea

This article examines the complexities entailed in assessing the oil pollution risks, primarily from a potential well blowout, involved in the development of North Sea oil resources. Among the factors to be considered in such an analysis are the economic benefits of oil production, the potential economic damages in the event of a blowout, the probability of a blowout occurring, the weather conditions in the North Sea, and the quality of spill cleanup equipment. The author concludes that the risk of pollution can be largely reduced with more stringent drilling and production regulations, and investment in cleanup equipment capable of operating under extreme weather conditions.

79A-0226
CLEANING UP - THE COSTS OF REFINERY POLLUTION CONTROL [book review]
Harris, T. 1978.
The International Journal of Environmental Studies 12(4):314-315.

Refineries, Wastewaters, Cost analysis, Socioeconomic effects, Pollution prevention, Pollution control, Book review

The reviewer favorably comments on the perspective provided by the title book [J.N. Boothe (ed.). London, M. Robertson and Co., Ltd., 1978. 112 p.] on "the true costs of environmentally acceptable refining." Relative costs schedules for pollution control by the 8 major oil refiners in the US, the technology involved, and the economic benefit to be derived from the recycling of recoverable material were discussed. The book's conclusion is that "even if the ultimate cost of pollution control is passed on to the consumer directly through price increases, the returns to the public in terms of a cleaner environment would appear to justify such costs."

79A-0227
OIL SHALE MINING, PROCESSING, USES, AND ENVIRONMENTAL IMPACTS. VOLUME 2. 1976 - APRIL 1977 (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)
Hundemann, A.S. 1977.
NTIS/PS-77/0387/9CCS. 138 p.

Bibliographies, Oil shale, Exploration, Development, Environmental effects

Topics covered are worldwide research on exploration, mining, retorting, chemistry, thermal studies, environmental impacts, and policies relating to oil shale research. This updated bibliography contains 131 abstracts, 112 of which are new entries to the previous edition.

79A-0228
PRINCIPLES OF SAFETY MEASURES AT PETROLEUM REFINERIES. 4TH EDITION [in Russian]
Kushelev, V.P. 1978.
Moscow, Khimya, 1978. 288 p.

Refineries, Safety, *Book

Summary not available.

[from Chemical Abstracts 89(12):#92134k. 1978]

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT, AND PRODUCTION

79A-0229
ENERGY/ENVIRONMENT '78: A SYMPOSIUM ON ENERGY DEVELOPMENT IMPACTS
Lindstedt-Siva, J. (ed.). 1978.
Los Angeles, Society of Petroleum Industry Biologists, 1978. 321 p.

Baseline studies, Ecosystems, Pipelines, Oil spills, Development, Environmental effects, *Conference

A total of 32 papers are included in the proceedings from the title symposium. The sessions were divided into six topic categories: 1) Baseline studies: Where do we go from here? 2) Ecosystem process analysis: A new approach to impact assessment; 3) Impact of energy development: Barges, pipelines, and power plants; 4) Energy development and public policy; 5) Oil spills: Fate and effects; and 6) Oil spills: Minimizing their environmental impact. [Relevant papers are abstracted separately in this issue.]

79A-0230
ENVIRONMENTAL ASPECTS OF DRILLING MUDS AND CUTTINGS FROM OIL AND GAS EXTRACTION OPERATIONS IN OFFSHORE AND COASTAL WATERS
Monaghan, P.H., C.D. McAuliffe, and F.T. Weiss. 1977.
Offshore Technology Conference, 9th, Houston, Texas, 1977. Vol 1:251-260. Paper OTC 2755.

Offshore drilling, Coastal waters, Environmental effects, US, *Drilling mud, *Cuttings

"Drilling mud and cuttings discharged from the more than 21,000 wells drilled offshore and in coastal waters of the United States have not caused detectable environmental damage either short-term or long-term. This is the conclusion of a study of reports of underwater observations during actual discharges of mud and cuttings, laboratory bioassay results for materials used in drilling muds, and actual well histories and laboratory results used in estimating the concentrations of mud components."

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER, AND STORAGE

1. Tankers and Ships

79A-0231
CADIZ BLAMED FOR RISE IN WORLD OIL SPILLS IN 1978 [news brief]
Anon. 1979.
Oil and Gas Journal 77(3):53.

Oil spills, Tankers, *Amoco Cadiz* spill, Oil transport, Statistics

According to the Tanker Advisory Center, Inc. of New York, about 1.893 million bbl of oil was spilled worldwide during the first 9 months of 1978 as compared with 1.302 million bbl for the same period in 1977. Most of this recent high spill total can be blamed on the *Amoco Cadiz* disaster of March 1978.

79A-0232
TALLY SHOWS RISE IN TANKER SPILLS DURING 1977 [news brief]
Anon. 1978.
Oil and Gas Journal 76(18):98.

Tankers, Oil transport, Oil spills, Statistics, *Annual data

According to the Tanker Advisory Center's annual casualty report for 1977, tanker spills increased both in frequency and volume lost, as compared with data for 1976. About 1.581 million barrels of oil were lost in 49 incidents in 1977, compared with 1.515 million barrels lost in 29 incidents in 1976. Twenty tankers were declared total losses in 1977; 70% of these vessels were built before 1961. Liberian tankers exceeded the worldwide average of casualties, as did American, British, and Greek flag vessels.

79A-0233
U.S. BACKS TANKER-SAFETY IMPROVEMENT [news brief]
Anon. 1978.
Oil and Gas Journal 76(5):34-35.

Tankers, Safety, Pollution prevention, Personnel training, US Government, International agreements

The US is strongly supporting international efforts to improve standards for crew training and tanker construction as part of a campaign to minimize loss of tankers and oil spillage. High standards for crews of US-flag vessels, and high international standards will be strictly and vigorously enforced, once set. Double bottoms and segregated ballast retrofitting are also being considered.

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER, AND STORAGE

79A-0234
THE LARGEST OIL SPILLS: INCONSISTENCIES, INFORMATION GAPS
Butler, J.N. 1978.
Ocean Industry 13(10):101-102, 105, 106, 108, 110, 112.

Tankers, Oil spills, Information systems, *1942-1978 spills, Statistical analysis, *Worldwide spill reporting needs

Thirty-five of the largest oil spills from 1942 to 1978 are reviewed and tabulated, with the purpose of demonstrating the need for a systematic and uniform worldwide reporting scheme for tanker accidents and other pollution incidents, particularly those occurrring on the high seas. Available information indicates a substantial increase in tanker accidents since 1975, and the need for international action to decrease tanker pollution is urgent. Fifty-two references to spill incidents and tanker accidents are included.

79A-0235
SUB-STANDARD TANKERS
van Peolgeest, F.M. 1978.
Netherlands, Netherlands Maritime Institute, 1978. __ p.

Tankers, Ships, Oil transport, Pollution prevention, Regulations, Safety

Summary not available. [possibly oil pollution related]

[from Marine Pollution Bulletin 9(5):113. 1978]

2. Pipelines

79A-0236
CANADA KILLS KITIMAT CRUDE LINE ON ENVIRONMENTAL GROUNDS [news brief]
Anon. 1978.
Oil and Gas Journal 76(10):47-49.

Pipelines, Canada, US, Environmental protection, Economics, Coastal waters, Tankers, *British Columbia, *Kitimat pipeline

A Canadian pipeline project designed to bring crude oil to US refiners has been cancelled because the environmental risks appear to outweigh the benefits to Canada. The decision is interpreted as a "victory for environmentalists concerned over the dangers of oil spills from large tankers operating in navigationally difficult British Columbian coastal waters."

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER, AND STORAGE

79A-0237
PIPELINE RUPTURES IN ILLINOIS [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(1):4.

Spill cleanup, Spill containment, Spill removal, Land farming, Crude oil, Pipelines, Illinois

An estimated 405,000 L (107,000 gals) of crude oil spilled from a ruptured pipeline near McKee Creek in Perry, Illinois, on 16 December 1978. Containment booms and vacuum trucks were used to clean up most of the easily accessible oil, controlled burns were used to remove oil in less accessible areas, and land farming techniques will be used in the spring to clean up the remainder of the spilled oil.

79A-0238
SPILLAGES FROM OIL INDUSTRY CROSS-COUNTRY PIPELINES IN WESTERN EUROPE (1976) (CONCAWE REPORT 9/77 OCTOBER 1977)
Anon. 1978.
The Science of the Total Environment 10(1):86-87.

Pipelines, Oil spills, Oil industry, Europe, *CONCAWE

The title annual report [CONCAWE, 60 Van Hogenhoucklaan, The Hague 2018, Netherlands] indicates high reliability of pipeline transportation, the gross spillage during 1976 amounting to only 0.00059% of the total volume transported. Of the 14 reported spillage incidents, 13 were directly concerned with pipelines and one occurred at a pumping station.

79A-0239
FLOW PROCESSES AND LEAK RATES ASSOCIATED WITH BROKEN UNDERWATER OIL PIPELINES
Fanneloep, T.K. 1977.
Norwegian Maritime Research 5(1):6-13.

Pipelines, Leakage, Oil transport, Oil discharges

The title study was analyzed by approximate engineering methods. Outflow speeds range from 1 km/sec for the "early-time" phase to <1 m/sec for the "late time" phase. "The problem of small leaks was also considered and an estimate is given of the minimum flow rate which can be detected by optical observations of the ocean surface above the leak."

[from Oceanic Abstracts 15(3):#78-03799. 1978]

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER, AND STORAGE

79A-0240
DEVELOPMENT OF A PIPELINE LEAK DETECTOR [product information]
Flournoy, N.E., and W.W. Schroeder. 1978.
Journal of Canadian Petroleum Technology 17(3):33-36.

Pipelines, Equipment, Monitoring, Leakage, Detection, Design-engineering, Product information

Designed to detect leaks in a pipeline by sensing the acoustic energy generated by escaping fluid, the Texaco leak detector pig locates leaks by the on-board recording of odometer and acoustic data. Several advantages of the Texaco device over similar leak surveying tools are listed.

3. Loading and Offloading Facilities

79A-0241
APPLICATION FILED FOR $800 MILLION OFFSHORE TEXAS OIL PORT
Anon. 1978.
Ocean Industry 13(10):141-142.

Deepwater ports, Offshore terminals, Oil transfer, Tankers, Gulf of Mexico, Texas, Pollution prevention

The proposed deepwater port would be located 42 km (26 mi) offshore in about 30 m (100 ft) of water and could directly offload from even the largest supertankers now in existence. A major advantage of the port is that "oil spills are expected to be greatly reduced...an offshore terminal for this project can be expected to reduce oil spills to 14% of that which would result from a similar volume moving through onshore facilities." In addtion, oil movement activity would be far away from biologically valuable and sensitive areas should a spill occur.

79A-0242
[Untitled news brief]
Foss, W.O. 1978.
National Fisherman 59(5):24.

International agreements, Deepwater ports, Oil transport, Oil transfer, Pipelines, Tankers, US, Norway, *LOOP

Tentative agreement is reported between the US and Norway to permit Norwegian-flag supertankers to use the new Louisiana Offshore Oil Port (LOOP), the first oil terminal to be licensed under terms of the

Deepwater Port Act. To become operational in 1980, its initial capacity will be about 1.4 million bbls of crude oil a day. The use of deepwater ports is expected to reduce both oil transportation costs and the risk of environmental damage to coastal areas.

4. Storage Facilities

79A-0243
CLEAN UNDERWATER STORAGE [news brief]
Anon. 1978.
Ocean Industry 13(8):100.

Storage, Pollution prevention, Ballast, Design-engineering, Equipment, *Underwater tanks

One of the greatest problems hampering underwater storage of oil near production platforms has been the possibility of oil spills into the sea. A German consortium of four companies has developed underwater storage compartments which separate the oil from seawater ballast by means a moveable diaphragm so that the two liquids never contact during loading, unloading, and storage.

5. Legal and Regulatory Aspects

79A-0244
ANTI-POLLUTION REGULATIONS COME INTO FORCE [news brief]
Anon. 1978.
Ocean Engineering 5(4):289.

Tankers, Ships, International conventions, IMCO, Ballast, Oil discharges, Pollution prevention

On 20 January 1978, the 1969 Amendments to the 1954 International Convention for the Prevention of Pollution of the Sea by Oil became effective. The Amendments deal with the quantities of oil which may be discharged in tanker ballast and are designed to strengthen the 1954 Convention. A brief history of tanker discharge practices resulting in this and other conventions adopted by IMCO since 1959 is given.

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER, AND STORAGE

79A-0245
IMCO COMMITTEES PUT FORWARD TANKER SAFETY PROPOSALS [news brief]
Anon. 1978.
Ocean Engineering 5(3):225.

Tankers, Ships, Safety, IMCO, International conventions, Pollution prevention, Segregated ballast, Crude oil washing, Oil transport

This article reports on the Joint Meeting of IMCO's Maritime Safety and Marine Environment Protection Committees, held in October 1977. The purpose of the meeting was to draft texts of proposals for improving safety and implementing pollution control measures in tankers, for consideration at the 1978 Conference on Tanker Safety and Pollution Prevention. Among the proposals to be considered were: 1) Mandatory segregated ballast tanks in new and existing ships; 2) installation of crude oil washing (COW) systems; 3) establishment of a Marine Safety Corps; 4) installation of inert gas systems; and 5) improved emergency steering standards.

79A-0246
TANKER BAN STILL ON IN PUGET SOUND [news brief]
Anon. 1978.
Oil and Gas Journal 76(38):74.

Tankers, Regulations, USCG, Puget Sound, *Tanker ban

Tankers exceeding 125,000 dwt will continue to be banned from Puget Sound waters until 30 June 1979. This extension of a temporary limitation will allow the USCG to complete preparing regulations for tanker operations in Puget Sound and its vicinity.

79A-0247
U.S., OTHERS SIGN STRICT TANKER PACT [news brief]
Anon. 1978.
Oil and Gas Journal 76(10):35.

US, IMCO, Regulations, Tankers, Segregated ballast, Crude oil washing, International agreements

The US and other maritime nations have reached new tanker regulation agreements through IMCO; the agreements must now be ratified by each of 106 IMCO member nations. The standards call for separate ballast and cargo tanks, crude oil washing systems, inert gas purging systems to avoid explosions, tougher inspection and certification standards, backup radar, and improved emergency steering equipment.

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER, AND STORAGE

79A-0248
LOS TALKS GRIND ON WITH MINIMAL PROGRESS
Casciato, D.E. 1978.
National Fisherman 59(5):39.

UN, Oceans, Legislation, International agreements, Regulations, Pollution control, Coastal zone management, *Law of the Sea

The reviewer reports little progress toward a UN Treaty to preserve the seas of the world at the seventh session of the Third United Nations Conference on the Law of the Sea (LOS) which met in spring 1978. "However, there was a measure of agreement on rules to strengthen the powers of coastal states to protect their coastlines and marine environment against the threat of pollution by giving such states the power 'to arrest' foreign ships that violate international pollution control standards."

79A-0249
SHIPPING CONTROL AND THE CHANGING USE OF MARINE SPACE
Couper, A.D., W. Burger, and S. Abdelgalil. 1977.
Maritime Policy and Management 4(6):409-423.

International conventions, UN, Safety, Regulations, Ships, Pollution prevention, *Law of the Sea

"The divisions of marine space as defined in the Revised Single Negotiating Text (RSNT) of the Third UN Conference on the Law of the Sea (UNCLOS III) in relation to marine accidents are discussed. Topics discussed include tanker casualties and oil spills, marine casualties off the northwest European coast in 1970, the avoidance of collision and grounding by scientific shipboard control, and the technical aspects of traffic lanes in confined waters."

[from Oceanic Abstracts 15(3):#78-03910. 1978]

79A-0250
[Untitled news brief]
Foss, W.O. 1978.
National Fisherman 59(6):24.

USCG, Regulations, Safety, Tankers, Equipment, *Radar

A new USCG regulation requiring tankers of 10,000 gross tons or more to carry an additional marine radar system will become effective 1 June 1979. Each system must operate independently so that failure of any component of one system will not render the other inoperative.

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER, AND STORAGE

79A-0251
CANADIAN GUIDELINES [news brief]
Gass, T.E. 1978.
Ground Water 6(3):219.

Groundwater, Contamination, Petrochemicals, Leakage, Storage, Guidelines, Canada

"Canada will be setting guidelines to reduce leakage from underground petrochemical storage tanks. Representatives of the petroleum industry, soil scientists and government officials are investigating storage tank corrosion problems, and factors which effect soil aggressiveness. In addition, development of more effective leaks detection equipment is under consideration."

79A-0252
IMCO CONFERENCE ON OIL POLLUTION FROM SHIPS [news brief]
Sierra Club. 1978.
Environmental Conservation 5(2):125.

International agreements, International conventions, IMCO, Tankers, Safety, Pollution control, Segregated ballast, Crude oil washing

Some of the proposals for improved tanker safety and oil pollution control standards considered at the February 1978 IMCO meeting are described. "Ironically, just one month prior to the [Amoco Cadiz] accident, France and Britain were among the nations...which rejected a US proposal for emergency steering gear that almost certainly would have prevented this type of tanker accident." Measures that were adopted included proposals for installation of back-up radar systems, collision-avoidance equipment, and inert gas systems in tankers. A proposal that would have mandated segregated ballast tanks in all tankers over 20,000 dwt was rejected, and a measure requiring installation of crude oil washing (COW) systems and segregated ballast tanks in new tankers over 20,000 dwt and existing tankers over 40,000 dwt was adopted instead.

79A-0253
OIL-SPILL IN BERMUDA: A CASE STUDY OF EFFECTIVE LITIGATION
Sleeter, T.D., and J.N. Butler. 1978.
Environmental Conservation 5(1):21-24.

Oil spills, Oil discharges, Ballast, Ships, Liability, Law enforcement, Source identification, Chromatography, Chemical analysis, Bermuda, *Case study, *Litigation

A gas chromatographic analysis of oil spilled from an ocean liner off the coast of Bermuda in 1976, as well as a strong body of circumstantial evidence, resulted in the successful prosecution of the captain of the

S.S. Statendam for discharge of oil-contaminated ballast. The conviction was upheld in an appeal to the Bermuda Supreme Court even though the captain claimed to be unaware of the polluted state of the ballast. The ruling may have set an important precedent as it "imposes absolute liability on the master of a vessel for any polluting discharge - whether or not he claims to be aware of their nature." The case is believed to be the first in which chemical analysis has contributed significantly to establishing guilt in an oil pollution incident.

79A-0254
IS OIL PORTS INQUIRY A FARCE? DID OTTAWA BEAUROCRACY [sic] INTEND CHARADE OR DID THEY CHANGE STEP?
Thompson, A.R. 1978.
Western Fisheries 96(1):19, 47-48.

Ports, Oil terminals, Tankers, Environmental effects, Safety, Canada, *British Columbia, *Kitimat oil port, *Inquiry

An open letter to the Cabinet and the people of Canada on the current situation of the West Coast Oil Ports Inquiry is presented by the commissioner. The hearings were authorized to "inquire into the environmental, social and navigational safety aspects of a proposed oil port at Kitimat and the broader Canadian concerns and issues related to west coast oil tanker traffic." The hearings were discontinued, and the author emphatically urges their continuation.

79A-0255
NEW INQUIRY NEEDED SOON TO SAFEGUARD COASTAL INTEGRITY
Thompson, A.R. 1978.
Western Fisheries 96(2):30, 32-35.

Ports, Oil terminals, Tankers, Oil transfer, Safety, Contingency planning, Coastal waters, Pollution prevention, Canada, *British Columbia

A final report from the West Coast Oil Ports Inquiry commissioner to the Canadian Minister of Fisheries and the Environment and to the Minister of Transport is presented. The inquiry was terminated when the Canadian government ruled out a proposed Kitimat oil port for the foreseeable future; however, in light of other proposed oil ports in the region the commissioner briefly discusses oil spill concerns, aspects of tanker safety, tanker traffic and navigation, and the need for adequate oil spill response planning and organization.

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER, AND STORAGE

6. General Aspects

79A-0256
THE BIG SPILL: CLEANING UP AFTER THE AMOCO CADIZ
Bender, E. 1978.
Sea Technology 19(10):22-24.

Tankers, Spill cleanup, Beach cleanup, Amoco Cadiz spill, Contingency planning, Equipment, *Litigation

Besides creating the largest marine oil spill ever and affecting 300 km of Brittany's coast, the wreck of the Amoco Cadiz tested Plan POLMAR, the French government's pollution response plan, and stimulated the enactment of new laws controlling tanker traffic. The variety of cleanup techniques used, and their efficiency and applicability, are reviewed. Cleanup planning recommendations are also presented. The first lawsuit following the disaster is described.

79A-0257
PIPELINE PROBLEMS EXACERBATE WEST COAST OIL SURPLUS
Carter, L.J. 1978.
Science 201(4356):594-598.

Trans-Alaska Pipeline, Crude oil, Oil transfer, Oil terminals, Oil industry, Tankers, Pipelines, Legislation, Environmental effects

The West Coast "oil glut" and strict local and state resistance to proposals to carry oil to the Midwest or to the Northern Tier states are more obstacles to the marketing of Alaskan crude oil. The author comments on political, legislative, and environmental effects of: The ARCO proposal to increase tanker traffic from Valdez to its Puget Sound terminal; the Sohio proposal to pipe oil from Long Beach, California, to Midland, Texas; the proposal of the Northern Tier pipeline Company of Montana to build a supertanker terminal at Port Angeles and pipe oil as far as Minnesota; and three other proposals.

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

1. Waste Treatment and Disposal Methods

79A-0258
PETROLEUM PROCESSING WASTES
Baker, D.A. 1978.
Journal Water Pollution Control Federation 50(6):1269-1270.

Bibliographies, Refining, Pollution control, Wastewater treatment, Sludge, Cost analysis, Chemical analysis, Sampling

A brief compilation of 15 important technical articles published in 1977, and dealing with refinery waste treatment is presented. Included are articles on: General process technologies for meeting refinery wastewater treatment standards, costs of pollution abatement programs, specific treatment techniques, and designs for wastewater and sludge handling, and sampling and analysis of refinery wastewaters.

79A-0259
FIBROUS OIL ADSORBENTS
Imao, S., T. Shinomiya, and S. Shoda. 1978.
Japanese Kokai (patent application) 78 16,459

Oil removal, Wastewaters, Adsorption, Sorbents, Patent

"Fibrous adsorbents useful for removal of oils from wastewaters are made from polypropylene (I) as core material and a mixture containing 5-50% inorganic particles selected from oxides or hydroxides of Mg, Zn, Pb, Fe, Co, and Ni and 50-95% (I) as sheath material, the core material/sheath material weight ratio must be ≥2."

[from Chemical Abstracts 89(10):#79837x. 1978]

79A-0260
OIL ADSORBENTS FOR OIL-CONTAINING WASTEWATER
Sato, H., M. Nakatani, and S. Sugimori. 1978.
Japanese Kokai (patent application) 78 26,289

Wastewater treatment, Adsorption, Sorbents, Wastewaters, Patent

"Adsorbents useful for removal of oils from wastewaters are made by mixing 10-80% Mg aluminate, Mg aluminosilicate, or a Mg aluminate-SiO_2 mixture with 20-90% water and polymers having isocyanate end groups in a water/polymer wt ratio of (5-95) : (95-5), reacting for 3-dimensional crosslinking, and crushing."

[from Chemical Abstracts 89(10):#79838y. 1978]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0261
$200,000 WASTEWATER SYSTEM FOR SANTA BARBARA CHANNEL WELLS [news brief]
Anon. 1978.
Ocean Industry 13(8):98.

Wastewater treatment, Disposal, Offshore production, Santa Barbara Channel, *Onshore treatment facility

A modified offshore wastewater discharge system for an onshore treatment facility has been designed to handle the wastes from Chevron's oil and gas production wells in the Santa Barbara Channel, near Carpinteria, California. The new discharge unit extends farther offshore and increases dilution of the wastewater.

79A-0262
WATER POLLUTION TECHNOLOGY [book review]
Author Unknown. 1978.
Water Pollution Control 77(1):148-149.

Wastewater treatment, Pollution control, Regulations, Legislation, Book review

A review is given of the title book [J.A. Black. Virginia, Reston Publishing Co. Inc., 1977. 260 p.]. "The main strength of the book lies in the excellent sections on the various water systems," while the information in some of the other sections is described as incomplete or obsolete. A chapter on legal aspects of water pollution control is included.

79A-0263
POLISHING PACK REMOVES OIL/SOLIDS [product information]
[AFL Industries, Inc.]. 1978.
Pollution Engineering 10(7):62.

Wastewater treatment, Emulsions, Oil-water separation, Equipment, Filtration, Coalescence, Product information

"A pressure filtration/coalescer, called a polishing pack, removes suspended solids and mechanically emulsified oil from process streams and wastewater,...operation is continuous and completely automatic." Information is available from AFL Industries [1149 Howard Drive, West Chicago, IL 60185].

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0264
GEOLOGICAL FACTORS AND THE TECHNOLOGY FOR INJECTING INDUSTRIAL WASTE WATERS INTO THE DEEP LAYERS OF SUBSOIL IN THE FEDERAL REPUBLIC OF GERMANY [in French]
Aust, H., and K. Kreysing. 1977.
Protection des Eaux Souterraines Captees pour l'Alimentation Humaine, Communications, Colloque National, Orleans-la-Source, Fr., 1-2 March 1977. p. 11-21.

Wastewaters, Disposal, Soil, *Underground wastewater injection, Germany

The wastewaters studied, which included those from oil industry, were injected from 500 m to 1500 m in abandoned oil wells, river basins, and castle moats.

[from Chemical Abstracts 89(12):#94574c. 1978]

79A-0265
MARINE DISPOSAL OF WASTE MATERIALS: POTENTIAL AND LIMITATIONS
Bostrom, R.C. 1976.
Ocean Resources Utilization. N.T. Monney (ed.). New York, American Society of Chemical Engineers, 1976. p. 131-153.

Waste oil, Disposal, Sources, Marine environment, *Engineering, Regulations, Oil discharges, Tankers, Refining, Natural seepage, Sludge, Cost analysis

The disposal into the sea of waste material generated by the land- and marine-based activities of man is examined. Sources of waste oil include oil sludges from the petroleum refining process, tanker discharges, and natural seepage. The methods and costs involved in marine waste disposal as well as the regulatory aspects are discussed. Recommendations for the direction of future research and the use of a systems analysis approach are made with reference to engineering problems associated with waste disposal.

79A-0266
PURIFICATION OF WASTE WATER OF PETROLEUM PUMPING STATIONS [in Russian]
Butseva, L.N., I.N. Myasnikov, and L.V. Gandurina. 1977.
Trudy VNII VODGEO, No. 65:8-10.

Wastewater treatment, *Petroleum pumping stations

Summary not available.

[from Chemical Abstracts 89(10):#79742n. 1978]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0267
DETERGENT COMPOSITIONS
Cook, T.E., and S.M. Craven. 1977.
Canadian Patent 1,014,039

Emulsifiers, *Detergents, Patent

The composition of a detergent suitable for emulsifying oil is given. The detergent consists of two monoester mixtures and a hydrocarbon solvent. [possibly oil pollution related]

[from Petroleum Abstracts 18(1):#243,151. 1978]

79A-0268
TANKER BALLAST WATER TREATING PLANT MEETS TOUGH SPECS
De Kok, F., and H.W. Marson. 1978.
Oil and Gas Journal 76(49):92-96.

Oil-water separation, Tankers, Ballast, Wastewater treatment, Disposal, Equipment, Mediterranean Sea

In designing an offshore oil tanker terminal at Sidi Kerir on the Egyptian Mediterranean coast, a key challenge was to design a system to adequately purify tanker ballast water and to reduce oil content of discharged waters from as much as 2000 ppm to 6 ppm or less. This article describes the oil-water separation equipment that was selected and the techniques used to lower the oil content to limits that routinely exceed the already high expectations of performance.

79A-0269
MICROBIAL CONCERNS WHEN WASTES ARE APPLIED TO LAND
Doran, J.W., J.R. Ellis, and T.M. McCalla. 1977.
Land Waste Management Alternative, Cornell Agricultural Waste Management Conference, 8th, 1976. R.C. Loehr (ed.). Ann Arbor, Michigan, Ann Arbor Science, 1977. p. 343-361.

Land farming, Biodegradation, *Waste treatment, Microorganisms

"A review with 47 references." [possibly oil pollution related]

[from Chemical Abstracts 89(12):#94453n. 1978]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0270
OZONIZATION OF INDUSTRIAL WASTE WATERS CONTAINING PHENOL AND PETROLEUM PRODUCTS [in Russian]
Efremova, E.A., S.P. Glukhov, P.A. Chebotarev, and E.A. Komrakova. 1977.
Gigienicheskie Aspekty Okhrany Zdorov'ya Naseleniya. p. 16-17.

Wastewater treatment, Oxidation, Petroleum products, *Ozonization

The title process was carried out and resulted in the complete decomposition of phenol, 85% decrease in the concentration of petroleum products, and significant increase in the transparency.

[from Chemical Abstracts 89(10):#79754t. 1978]

79A-0271
TOXIC SUBSTANCES IN WASTE WATERS OF PETROCHEMICAL PLANTS AND THEIR EFFECT ON HYDROBIONTS [in Russian]
Grushko, Y.M., O.M. Kozhova, and L.M. Mamontova. 1978.
Gidrobiologicheskii Zhurnal 12(2):55-60.

Wastewaters, Petrochemicals, Toxicity, Biological effects, Aquatic environment, *Aquatic organisms

"A review with 52 references indicating the need to dilute waste water from petrochemical plants before discharge into natural waters."

[from Chemical Abstracts 89(11):#85338b. 1978]

79A-0272
WATER REUSE STUDIES
Grutsch, J.F. 1977.
American Petroleum Institute Publication 949. 132 p.

Wastewaters, Wastewater treatment, Reuse, Refineries

Methods for minimizing or eliminating petroleum refinery wastewater discharges were developed, primarily for "grass roots" refineries.

[from Chemical Abstracts 89(10):#79759y. 1978]

79A-0273
OIL REFINERY WASTEWATER TREATMENT BULLETIN [product information]
[ICI Americas, Inc.]. 1978.
Oil and Gas Journal 76(8):138.

Wastewater treatment, Refineries, Product information, *Activated carbon

A publication entitled Treatment of Oil Refinery Wastewaters with Powdered Activated Carbon is available free as Bulletin #904-3 from ICI Americas, Inc., Wilmington, DE 19897.

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0274
INDUSTRIAL WASTE WATER AND WASTES [book review]
Jenkins, S.H. 1978.
Water Research 12(2):136-137.

Petrochemicals, Wastewater treatment, Pollution control, *Proceedings, Book review

A favorable review is given of the title book [B. Gransson (ed.). Stockholm, Pergamon Press, 1975.]. Mention is made of one article by Benedetti, Scarfi, and Vandi which examines the philosophy of pollution control in the petrochemical industries and evaluates the established processes for removing pollutants from this industry's wastewaters.

79A-0275
ACTIVATED POROUS COKE
Kawamura, K., T. Matsuo, and T. Iura. 1978.
Japanese Kokai (patent application) 78 07,701

Wastewater treatment, Adsorption, Sorbents, Oil-water separation, Oil removal, Patent

"Semicoke is treated with steam and/or CO at 400-900°, optionally treated with a steam-heating gas mixture to obtain porous and activated coke. The coke is used as an adsorbent to remove oils and COD from industrial wastewaters."

[from Chemical Abstracts 89(10):#79856c. 1978]

79A-0276
TREATMENT OF WASTEWATER CONTAINING OILS
Kodaira, T. 1978.
Japanese Kokai (patent application) 78 09,051

Wastewater treatment, Oil-water separation, Flocculation, Patent

"Wastewaters containing oils are salted out with an inorganic flocculant ...at a pH at which no flocs are formed. The floating oils are removed, and the wastewaters are treated with an alkali or acid solution to flocculate the residual oil and suspended solids, followed by removal of flocs formed."

[from Chemical Abstracts 89(12):#94676n. 1978]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0277
THE EFFECT OF PETROCHEMICAL STRUCTURE ON METHANE FERMENTATION TOXICITY
Lin Chou, W., R.E. Speece, R.H. Siddiqi, and K. McKeon. 1978.
Progress in Water Technology 10(5):545-558.

Petrochemicals, Industries, Wastewaters, Bacteria, Biodegradation, Toxicity, *Methane fermentation, *Anaerobic digestion

Even though anaerobic digestion of wastewaters from petrochemical plants offers many advantages over the commonly used energy intensive aerobic processes, a lack of operational data on which designs could be based has prevented its utilization. In the title study, toxicity of 52 petrochemicals to unacclimated methane cultures developed on acetate substrate was assayed. Definite correlations of molecular structure and toxicity were demonstrated. [possibly oil pollution related]

79A-0278
PACKAGED SYSTEM CLEANS OILY WATER [product information]
[Mapco, Inc.]. 1978.
Pollution Engineering 10(7):60.

Wastewater treatment, Precipitation, Sludges, Product information, *Coagulation

A chemical treatment system for the continuous and automatic removal of chemically bound or suspended oil from wastewaters is described. Oil and other contaminants are removed by chemical coagulation, precipitation, and sludge dewatering. Information is available from Mapco, Inc. [Process and Pollution Controls Division, 1800 S. Baltimore, Tulsa, OK 74119].

79A-0279
OILY WATER SKIMMER [product information]
[Marine Construction & Design Co.]. 1978.
Pollution Engineering 10(9):66.

Wastewater treatment, Oil removal, Skimmers, Equipment, Product information

Surface oils are skimmed from wastewaters with a skimmer that uses an endless belt recovery module. The device picks up all types of oil and grease as well as floating debris. Information is available from the Marine Construction & Design Co. [2305 W. Commodore Way, Seattle, WA 98199].

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0280
Q&A: OILY WASTEWATER COMPRISES FREE BOOKLET [product information]
[Nalco Chemical Co.]. 1978.
Oil and Gas Journal 76(30):74.

Wastewater treatment, Product information

Information about oily wastewater treatment is presented in a booklet available from Nalco Chemical Co. [2901 Butterfield Rd., Oak Brook, IL 60521].

79A-0281
COALESCE YOUR WASTE OIL [product information]
[Peerless Pump Co.]. 1978.
Pollution Engineering 10(9):87.

Waste oil treatment, Coalescence, Equipment, Product information

Described is the Series P Sealtrode Electrode Floatless Pump Controller which prevents electrodes from becoming coated with oil, grease and other materials. Information is available from Peerless Pump Co. [1200 Sycamore St., Montebello, CA 90640].

79A-0282
TOXICOLOGICAL FEATURES OF PETROLEUM REFINERY WASTES [in Polish]
Praszkiewicz, A. 1977.
Gospodarka Wodna 37(10):300-303.

Refineries, Chemical effects, Toxicity, Biological effects, Waste oil, Wastewaters, Poland

"Chemical and biological problems connected with the Mazovian Petroleum Refinery are discussed."

[from Chemical Abstracts 89(10):#79749v. 1978]

79A-0283
OIL-ABSORBING MATERIAL CONSISTING OF SMALL SECTIONS OF A FOAMED PLASTIC WITH OPEN CELLS
Sandstrom, K. 1978.
Swedish Patent 399,905

Wastewater treatment, Sorbents, Absorption, Patent, *Polyurethane foam

"The title materials...which rapidly absorb oil are manufactured from binders and grated pieces...of soft polyurethane foam which has been mechanically treated to break through the cell walls without breaking the foam apart completely." [possibly oil pollution related]

[from Chemical Abstracts 89(12):#90833p. 1978]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0284
MAGNETIC SUBSTANCE EMULSIONS FOR TREATMENT OF WASTEWATERS CONTAINING OILS
Takeuchi, H., and Y. Matsuyama. 1978.
Japanese Kokai (patent application) 78 17,579

Wastewater treatment, Oil-water separation, Surfactants, Dispersants, *Magnetic separation, Patent

"Dried magnetic substance powder...is mixed with a fat-soluble material ...or its solution in a solvent, and a surfactant or dispersant is added to obtain a magnetic substance emulsion useful for removal of oils from wastewater by magnetic separation."

[from Chemical Abstracts 89(12):#94660c. 1978]

79A-0285
TREATMENT OF WATER CONTAINING DISCHARGED OILS. 2 [in Japanese]
Tomida, S. 1977.
Sangyo Kogai Boshi Gijutsu. p. 119-126.

Wastewater treatment, Oil discharges, Waste oil, Oil removal

"A review with 9 references."

[from Chemical Abstracts 89(10):#79598v. 1978]

2. Oil-Water Separation

79A-0286
BARGE SEPARATES OIL, WATER [product information]
Anon. 1978.
Sea Technology 19(11):50.

Oil-water separation, Ballast, Product information, *Barge

The 51 m barge can take aboard up to 2,200 tons of ballast water from ships at sea or in the harbor. A highly automated oil-water separation plant on board separates the oily water at a rate of 25,000 L/hr., reducing oil from 10 parts per thousand to 5 ppm.

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0287
ISRAELI DEVELOPMENT [news brief]
Anon. 1978.
Effluent and Water Treatment Journal 18(3):108.

Oil-water separation, Ultrafiltration, Wastewaters, Industries, Israel

A Weizmann Institute scientist, Gerald Tanny, has developed an ultrafiltration technique for separating oil-water emulsions, by using plastic hollow fibers. The technique would handle industrial waste oil emulsions and is claimed to be less expensive than oil-water separation methods currently in use.

79A-0288
LABORATORY STUDIES OIL-WATER SEPARATION [news brief]
Anon. 1978.
Petroleum Engineer International 50(11):12.

Oil-water separation, Platforms, Offshore production, Storage, *Parallel plate separators, *Gas flotation, Equipment, Monitoring

The UK's Warren Spring Laboratory is assessing equipment used offshore for reducing oil contamination in waters discharged from oil production platforms. Parallel plate oil-water separators are generally used to treat water displaced from oil storage tanks; dispersed gas flotation systems are used for the treatment of formation water that is produced in association with the crude oil. It is hoped that information produced by field trials will enable improvements to be made in existing equipment and monitoring devices.

79A-0289
OIL/WATER SEPARATOR SYSTEM [product information]
[Balston, Inc.]. 1978.
Effluent and Water Treatment Journal 18(1):42.

Oil-water separation, Equipment, Product information, Coalescence, Filtration

The Balston coalescing filter tube technique for removing fine oil particles from water and other liquids has been applied to a low-cost separator unit which rapidly and economically reduces the bulk disposal of oil and water effluent. "Oil separation down to less than 10 ppm is both a practical and economic proposition." Information is available from Balston, Inc. [P.O. Box C, Lexington, MA 02173].

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0290
PROCESS AND APPARATUS FOR SEPARATING OIL FROM AQUEOUS LIQUIDS
Chapman, W.F. 1977.
French Patent 2,333,549

Oil-water separation, Wastewater treatment, Design-engineering, Pollution control, Patent, *Fluidized beds

An oil-containing aqueous liquid is passed through a fluidized bed of oleophilic granules which catch and amalgamate the oil droplets. When enough oil has accumulated, it leaves the bed in large drops which may be more easily separated from the liquid.

[from Petroleum Abstracts 18(1):#243,155. 1978]

79A-0291
OIL/WATER SEPARATORS [product information]
[Enquip, Inc.]. 1978.
Pollution Engineering 10(6):89.

Oil-water separation, Equipment, Gravity separation, Product information

This company features an expanded line of gravity displacement type oil-water separators; units range in size from a 5300 L (1400 gal) to a 46,400 L (12,500 gal) capacity. The all-metal units feature a chamber and baffling arrangement "which permits full utilization of the gravity differential-time principle of Stokes' Law for separating immiscible liquids." Information is available from Enquip, Inc. [3210 N. Lewis, Tulsa, OK 74150].

79A-0292
OIL/WATER SEPARATOR [product information]
[Enquip, Inc.]. 1978.
Environmental Science and Technology 12(10):1213.

Oil-water separation, Hydrocarbons, Wastewaters, Product information

"The separator can contain up to 20,000 gal of product surges. It will separate water and recoverable hydrocarbons while discharging an effluent at a rate that varies from 500-1100 gal/min." Information is available from Enquip, Inc. [3210 N. Lewis, Tulsa, OK 74150].

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0293
HIGH CAPACITY OIL-WATER SEPARATOR
Hura, M., and J. Mittleman. 1978.
Spill Technology Newsletter 3(5):32-44.

Oil-water separation, Wastewater treatment, USN, Equipment, Design-engineering

As part of a project sponsored by the US Navy Pollution Abatement Program, a high capacity oil-water separation unit, the OPC-3000, has been developed. This paper reviews the development and final design of the unit and describes its operational characteristics, the acceptance tests and preliminary experiences, and the final performance evaluations in handling routine oily wastes. With most oily wastes, the OPC-3000 is able to produce legally dischargeable water effluents.

79A-0294
AN OIL-WATER SEPARATOR
Kamatsubara, H. 1977.
British Patent 1,490,207

Oil-water separation, Wastewater treatment, Design-engineering, Equipment, Patent

The separator contains a set of spaced, inclined plates within the separation area. "An object of the present invention is to improve the oil-water separating of such separators, and to reduce the size of the separation chamber required in it."

[from Petroleum Abstracts 18(1):#243,156. 1978]

79A-0295
OIL SEPARATION FROM OIL EMULSIFIED WASTEWATERS
Koyama, M., A. Kozuka, Y. Sato, and N. Ohtsuka. 1976.
Japanese Kokai (patent application) 77 144,155

Oil-water separation, Wastewaters, Emulsions, Surfactants, Patent, *Ozonization

"Wastewaters containing ≥1 oils and ≥1 surfactants are ozonized to remove the oils. Thus, a cutting oil (9100 ppm)-containing wastewater was ozonized, and the treated water contained 7 ppm oil."

[from Chemical Abstracts 89(8):#64684w. 1978]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

79A-0296
OIL/WATER SEPARATOR DATA [product information]
[National Marine Service, Inc.]. 1978.
Oil and Gas Journal 76(47):182.

Oil-water separation, Equipment, Product information

The Oilmaster oil/water separation system is capable of processing up to 56,000 L (15,000 gal) per day of any oil which has a specific gravity less than water and is insoluble in water. Information is available from National Marine Service, Inc. [827 Hanley Industrial Court, St. Louis, MO 63144].

79A-0297
CROSS FLOW OIL/WATER SEPARATOR [product information]
[Pielkenroad Separator Co.]. 1978.
Pollution Engineering 10(7):64.

Oil-water separation, Equipment, Product information

The Cross Flow Corrugated Plate separator utilizes a series of corrugated plates mounted in a rectangular or circular steel frame. Water passes horizontally between the closely spaced plates, creating laminar flow conditions which encourages oil-water separation. The oil floats to the surface of the tank where it is skimmed off. Information is available from the Pielkenroad Separator Company [P.O. Box 53563-T, Houston, TX 77052].

79A-0298
OIL-WATER SEPARATION
Takenishi, S., and M. Miyai. 1977.
Japanese Patent 77 47,925

Oil-water separation, Wastewaters, Absorption, Sorbents, Oil removal, Patent

"One end of a tube packed with oleophilic organic and (or) inorganic fibers is soaked in a floating oil layer or oil-drop dispersion layer in a wastewater tank whose liquid surface is maintained at a constant level. The other end of the tube is suspended outside the tank. The oil is removed from the tank by capillary action and by the absorption capacity of the fiber."

[from Chemical Abstracts 89(10):#79790b. 1978]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

3. Waste Oil Reclamation and Reuse

79A-0299
WILL LUBE REFINERS RECLAIM WASTE OIL?
Nelson, W.L. 1978.
Oil and Gas Journal 76(20):75-76.

Reclamation, Waste oil, Crankcase oil, Lubricating oil, Economics, Refining, Cost analysis, Recycling

Advantages of waste oils over crude oils include their richness in lubricating oil, (65-80%) compared to that in crude oil (10-15%), and their lower content of residues (30%) when compared to crude stock used in regular lube manufacture (45-65%). Nearly 60% of US needs for lubricating oil could be met by recycling. Reluctance on the part of refiners is cited as the major hindrance to waste oil salvaging, and possible reasons for this reluctance are cited. Overall costs of waste oil refining are significantly lower than refining with crude oil.

4. Legal and Regulatory Aspects

[No entries.]

H. RECENT POLLUTION INCIDENTS

79A-0300
ANDROS PATRIA OIL WASHES ONTO NORTHERN COAST OF SPAIN [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(2):2.

Oil spills, Tankers, Crude oil, Movement, Beaches, Coasts, Spain, *Andros Patria spill

In early January 1979, almost a week after the Greek tanker Andros Patria incurred a hull fracture west of Cape Villano, Spain, spilled crude oil began washing onto beaches along the northern coast of Galicia, Spain.

79A-0301
ANDROS PATRIA AWAITS OFFLOADING SOUTH OF AZORES [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(3):2.

Oil transfer, Tankers, Spill cleanup, Shorelines, Oil spills, Oil slicks, Equipment, *Andros Patria spill

Salvors were waiting for improved weather conditions to begin offloading the damaged Greek tanker, Andros Patria. Meanwhile, cleanup efforts of the 40 km of Galician coastline impacted by the oil slick continued. About 200 tons of dispersants have already been used on the slick; booms and vacuum pumps were also being used to clean up the spilled oil.

79A-0302
BARGE GIM 106 SPILLS GASOLINE AFTER RAMMING
Anon. 1978.
Oil Spill Intelligence Report 1(9):1.

Tankers, Spill cleanup, USCG, Louisiana, Mississippi River, Gasoline, *Barge GIM 106 spill

On 15 November 1978, an estimated 49,000 to 57,000 L (13,000 to 15,000 gals) of gasoline spilled into the Mississippi River in Louisiana when the tanker barge GIM 106 grounded against a piling and ruptured its hull while attempting to dock. Cleanup crews contracted by the USCG used sorbent pads to remove the spilled gasoline; special precautions were necessary because of the fire hazard posed by the gasoline.

H. RECENT POLLUTION INCIDENTS

79A-0303
BRITISH TANKER SPILLS BUNKER C IN SHETLAND ISLANDS [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(1):2.

Oil spills, Spill cleanup, Oil terminals, Ports, Shorelines, Spill containment, Scotland, *Esso Bernicia spill

An estimated 1100 tons of bunker C oil spilled from the ruptured tanker Esso Bernicia while moored at the Sullom Voe terminal in the Shetland Islands, Scotland on 30 December 1978. Booms were deployed to contain the spill along 1 km of shoreline at the terminal. Manual cleanup of the impacted beaches, inaccessible to heavy equipment, is described.

79A-0304
CARGO TANK OVERFLOWS IN CHARLESTON, SOUTH CAROLINA [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(11):2.

Tankers, Fuel oil, Spill cleanup, Spill recovery, *Aries spill, South Carolina

During offloading operations on 3 December 1978, an estimated 34,000 L (9000 gals) of No. 6 fuel oil spilled from an overflowing cargo tank onboard the U.S. tanker Aries into the Cooper River about 7 km north of Charleston, South Carolina. Spill cleanup and oil recovery operations,which expected to take until late December 1978, are briefly described.

79A-0305
CIBRO PHILADELPHIA OFFLOADED IN BAYONNE [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(10):2.

Oil transfer, Ships, Fuel oil, Oil spills, New York, *Cibro Philadelphia spill

Over 167,000 L (47,000 gals) of No. 2 fuel oil were spilled when the barge Cibro Philadelphia grounded on November 28, 1978 in New York's East River. Since then, the damaged barge has been towed to the EXXON refinery terminal at Bayonne, New Jersey for offloading and repairs.

H. RECENT POLLUTION INCIDENTS

79A-0306
CLEANUP COMPLETED ALONG PUERTO RICO COAST [news brief]
Anon. 1978.
Oil Spill Intelligence Report 2(1):2.

Tankers, Spill cleanup, Ships, Fuel oil, Coasts, Puerto Rico, *Peck Slip spill

Cleanup efforts along a 96 km stretch of eastern and northeastern Puerto Rico were completed by Sun Oil Company on 31 December 1978. An estimated 1,764,000 L (462,000 gals) of bunker C oil spilled from the damaged barge *Peck Slip* on 19-20 December 1978, but cleanup operations did not begin until the 21st due to heavy swells. Various booms and sorbents were used in the cleanup efforts.

79A-0307
CLEANUP OF FURNACE OIL UNDER ICE CONTINUES IN INDIANA [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(5):2.

Oil spills, Pipelines, Fuel oil, Spill cleanup, Streams, Ice, Freshwater, *Indiana

Cleanup will continue until the spring thaw of the estimated 3,000 gal remaining under ice-cover on White Lick Creek in Brownsburg, Indiana. Over 92,000 L (33,000 gal) of heating oil spilled from a ruptured Shell Pipeline Corporation pipeline on 11 January 1979.

79A-0308
CLEANUP ON ELM RIVER NEAR COMPLETION [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(9):2.

Spill cleanup, Illinois, Pipelines, Rivers

By late November 1978, spill cleanup efforts were near completion for a pipeline spill near Cisne, Illinois, which had occurred on 16 November 1978. Only about 7600 L (2000 gals) of the 318,000 L (84,000 gals) of spilled oil remained to be removed from the Elm River. Booms, skimmers, and vacuum pumps were used in the effort.

H. RECENT POLLUTION INCIDENTS

79A-0309
COLLAPSED BOOM RELEASES SPILLED OIL IN SHETLAND ISLANDS [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(2):3.

Spill containment, Spill cleanup, Booms, Tankers, Oil terminals, Release, Beaches, Environmental effects, Birds, Mortality, Scotland, *Esso Bernicia spill

An inflatable Vikoma boom collapsed and released about 550 tons of the oil remaining from the 1100 tons spilled by the ruptured British tanker Esso Bernicia at the Sullom Voe terminal. The released oil landed at scattered locations onshore along Yell Sound and killed several hundred birds.

79A-0310
COLLISION·IN THE MISSISSIPPI RIVER CAUSES TAR SPILL [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(3):3.

Tar, Ships, Spill cleanup, Sorbents, Equipment, Mississippi River, Louisiana

When the Greek motor vessel, Trade Nomad, Collided with the tug, Dixie Star, about 76,000 gal of S2-tar, carbon black feed stock, spilled and sank into the Mississippi River near White Castle, Louisiana. Conwed sorbents were used to clean up the tarry material.

79A-0311
FARMINGTON BAY SPILL UPDATE
Anon. 1978.
Oil spill Intelligence Report 1(9):2.

Spill cleanup, Crude oil, Pipelines, *Cleanup costs, *Utah, *Farmington Bay spill

Cleanup of the crude oil that spilled from a pipeline near Farmington Bay, Utah, in early November 1978, continued into December 1978. The cleanup was concentrated in swamp areas which were not easily reached by heavy equipment and required a labor-intensive effort. As a result, cleanup costs will probably exceed $200,000.

H. RECENT POLLUTION INCIDENTS

79A-0312
FERRY GLACIER QUEEN SINKS IN ALASKAN WATERS
Anon. 1978.
Oil Spill Intelligence Report 1(9):2.

Ships, Oil spills, Fuel oil, Alaska, USCG, NOAA, USN, *Glacier Queen ferry spill

Since the Glacier Queen sank near Seldovia, Alaska, on 8 November 1978, about 57,000 to 190,000 L (1,500 to 5,000 gals) of heavy fuel oil have leaked from its fuel tanks. USCG-directed cleanup teams have deployed containment booms around the vessel; a NOAA scientific support team has evaluated the situation and found no apparent environmental damage to Seldovia Bay, and the US Navy has initiated and contracted out salvage operations that will last until the end of 1978.

79A-0313
FRENCH TANKER EXPLODES AND SPILLS OIL IN BANTRY BAY [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(2):1.

Oil spills, Tankers, Oil terminals, Ports, Crude oil, Spill cleanup, Shorelines, Ireland, *Betelgeuse spill

Two successive explosions on the French tanker Betelgeuse caused an estimated 40,000 tons of Saudi Arabian crude oil to spill into Bantry Bay, Ireland, on 8 January 1979. The explosions occurred during unloading operations at the Gulf Oil terminal at Whiddy Island. The spilled oil heavily impacted the northern shores of Whiddy Island, and cleanup efforts included the use of pumps, skimmers, sorbents, and dispersants.

79A-0314
GAS OIL SPILL IN PUERTO RICO DISSIPATES RAPIDLY [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(2):3.

Oil spills, Fuel oil, Bays, Puerto Rico

An estimated 45,000-76,000 L (12,000-20,000 gals) of light gas oil spilled on 1 January 1979 into a drainage ditch on the property of Puerto Rico Olefins Co. and flowed 1.5 km into Tallaboa Bay.

H. RECENT POLLUTION INCIDENTS

79A-0315
GROUNDED CIBRO PHILADELPHIA SPILLS OIL IN NEW YORK
Anon. 1978.
Oil Spill Intelligence Report 1(9):1.

Tankers, Oil spills, Oil transport, New York, Rivers, *Cibro Philadelphia spill

Between 159,000 and 174,000 L (42,000 and 46,000 gals) of No. 2 fuel oil spilled into the East River of New York on 28 November 1978 after the tanker barge Cibro Philadelphia grounded in the Hell Gate area. Rapid currents dispersed the spill before oil removal could be attempted. Overflights revealed no removable accumulations of oil in the area, and minimal environmental damage was reported.

79A-0316
GROUNDED VESSEL OFFLOADED NORTH OF BERMUDA [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(5):2.

Tankers, Oil transfer, Fuel oil, Oil spills, Coral reefs, Bermuda, *Mari Boeing spill

About 900 tons of No. 6 fuel oil were offloaded from the 20,000-DWI Liberian bulk carrier, Mari Boeing, which remains grounded on a coral reef about 18 km north of Bermuda. Over 60,000 L (16,000 gal) were spilled from the vessel after the grounding on 27 December 1978.

79A-0317
GROUNDED VESSEL SPILLS NO. 6 OFF BERMUDA COAST [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(1):3.

Oil spills, Fuel oil, Ships, Movement, Coasts, Spill cleanup, Bermuda, *Mari Boeing spill

The Liberian bulk carrier Mari Boeing grounded on a coral reef about 18 km north of Bermuda on 27 December 1978 and spilled a maximum of 61,000 L (16,000 gals) of No. 6 fuel oil. Most of the oil was washed out to sea, although isolated patches of oil reached the rocky northern coast of Bermuda. Booms, pumping equipment, and sorbents were used in the cleanup effort.

H. RECENT POLLUTION INCIDENTS

79A-0318
IRENE S. LEMOS SPILL CLEANUP COMPLETE [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(9):3.

Ships, Spill cleanup, Mississippi River, Louisiana, *Irene S. Lemos spill, *Ship collision

Using diverse containment and spill cleanup products and equipment, cleanup crews completed their efforts to remove oil from the Mississippi River, spilled during the collision of the title vessel with another ship. Cleanup operations were complete by late November 1978.

79A-0319
LANDFILL MAY CONTAIN ONE MILLION GALLONS OF OIL [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(10):1.

Leakage, Spill cleanup, Gasoline, Fuel oil, USCG, New York, Reclamation, Oil discharges

Nearly 4 million liters (1 million gals) of gasoline and No. 2 fuel oil may be contained underground in a landfill near Newtown Creek, Brooklyn, New York. The petroleum products were found to be leaching into the creek in September by USCG overflights; since then the USCG has contracted a private spill cleanup contractor to remove and recover the oil in the landfill and to sell the recovered oil to help defray cleanup costs. Oil is currently being recovered at the rate of about 18,200 L (5100 gals) per week.

79A-0320
MARYLAND SPILL ESTIMATE REVISED UPWARD [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(1):4.

Tankers, Spill cleanup, Fuel oil, Shorelines, Marshes, Oil discharges, Maryland, *Lang Fonn spill

Cleanup of an estimated 187,000-227,000 L (50,000-60,000 gals) of No. 6 fuel oil continued along shoreline and marshland at Piney Point Creek in Maryland. The Norwegian tanker, Lang Fonn, accidentally discharged the oil on 13 December 1978 at the Stewart Petroleum Company in Piney Point.

H. RECENT POLLUTION INCIDENTS

79A-0321
MASSIVE SPILL FROM RUPTURED TANKER OFF SPAIN [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(1):1.

Oil spills, Tankers, Crude oil, Dispersants, Oil slicks, Spreading, Spill cleanup, Spain, *Andros Patria spill

An estimated 50,000 tons of crude oil began spilling from the ruptured Greek tanker Andros Patria on 31 December 1978 about 38 km west of Cape Villano, Spain. Detergents were applied to the two main slicks in an effort to disperse the oil.

79A-0322
OVER 68,000 TONS OF OIL OFFLOADED FROM ANDROS PATRIA [news brief]
Anon. 1979.
Oil Spill·Intelligence Report 2(5):2.

Tankers, Oil transfer, Oil spills, Crude oil, Shorelines, Spill cleanup, Equipment, Spain, *Andros Patria spill

On 29 January 1979, about 36,000 long tons of crude oil were offloaded from the damaged Greek tanker Andros Patria to the British Petroleum lightering vessel, British Dragon, making the total offloaded amount from the Andros Patria 68,000 long tons. An explosion in a ballast tank on board the tanker caused a spill of about 45,000 tons of oil. About 5000 tons of the oil washed onto the Spanish coastline and was cleaned using vacuum pumps, booms,and manual methods.

79A-0323
PIPELINE EXPLOSION IN NORTHERN COLOMBIA KILLS 14 [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(3):3.

Oil spills, Pipelines, Petroleum products, *Colombia, *Pipeline explosion

An explosion in San Raphael de LeBrija, Colombia, killed at least 14 people and ruptured an Eco Petroleum Company pipeline. An unknown quantity of oil spilled from the pipeline.

H. RECENT POLLUTION INCIDENTS

79A-0324
PROBES BEGIN INTO BANTRY BAY TANKER DISASTER [news brief]
Anon. 1979.
Oil and Gas Journal 77(3):43.

Tankers, Oil spills, Ireland, *Bantry Bay, *Betelgeuse spill

Briefly reviewed is the explosion of the French tanker Betelgeuse in early January 1979 in southern Ireland's Bantry Bay. Other recent tanker incidents in European waters are also mentioned.

79A-0325
PUNCTURED TANKER SPILLS AT LEAST 6,000 BARRELS IN TEXAS [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(5):1.

Oil spills, Spill cleanup, Tankers, Crude oil, Texas, *Esso Bayway spill

On 28 January 1979, up to 1.03 million L (273,000 gal) of light Arabian crude oil spilled from the Liberian-owned tanker, Esso Bayway, in the Neches River near Port Neches, Texas. Monitored by the USCG, the spill response included the use of booms, vacuum trucks, and sorbent pads.

79A-0326
RAMMED SHIP LEAKS OIL OFF SINGAPORE [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(2):3.

Oil spills, Ships, Tankers, Leakage, Fuel oil, Singapore, *Ship collision

An undetermined amount of fuel oil spilled from the lumber-carrying ship Manor No. 11 when the vessel collided with the Liberian tanker Majestic Pride off Singapore on 2 January 1979.

79A-0327
RUPTURED BARGE SPILLS GASOLINE OFF NEW YORK [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(11):1.

Evaporation, Oil spills, New York, Tankers, *Barge Robert L. Poling spill

On 8 December 1978, about 190,000 L (50,000 gal) of unleaded gasoline spilled into Gravesand Bay, New York, when a tugboat collided with the oil barge Robert L. Poling. Cleanup was not attempted since the gasoline either evaporated or dissipated in the currents.

H. RECENT POLLUTION INCIDENTS

79A-0328
RUPTURED ICE-BREAKER SPILLS OIL IN ARCTIC [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(10):1.

Ships, Oil spills, Ice, Arctic, Canada, Fuel oil, *Under-ice spill, *Ice breaker

On 15 November 1978, about 230 tons of diesel oil were believed spilled under ice cover near Cape Perry, Northwest territories, by the damaged Canadian Coast Guard ice-breaker, John A. McDonald. The damage and oil loss was not noticed until November 25; since then overflights have attempted to locate the spill site. Spill cleanup by burning will probably be attempted in spring 1979, if the spilled oil surfaces through the melting ice and can be located.

79A-0329
SEARCH FOR SPILLED OIL CONTINUES IN AMUNDSEN GULF [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(11):2.

Fuel oil, Oil spills, Arctic, Canada, *Amundsen Gulf, Ice

Reconnaissance flights to help locate 230 tons of diesel oil spilled under ice in mid-November 1978 are continuing in the Canadian Amundsen Gulf region. However, "it is unlikely that the lost oil will be sighted until warmer weather returns to the Gulf in late March or early April. At that time, the oil may begin to surface as the ice breaks up."

79A-0330
SHIP COLLISION AND SPILL OFF KOBE, JAPAN [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(9):2.

Ships, Fuel oil, Oil spills, Environmental effects, Japan, Economic effects, Spill cleanup, *Jupiter Gas spill

On 22 November 1978, the rupture of several of the fuel oil storage tanks on the LNG carrier Jupiter Gas resulted in a spill that reportedly caused serious damage to nearby seaweed farms. The Japan Maritime Safety Agency used booms and sorbents to clean up the spill.

H. RECENT POLLUTION INCIDENTS

79A-0331
SHIP WITH DIESEL FUEL SINKS IN CARIBBEAN [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(1):3.

Oil spills, Ships, Fuel oil, Leakage, Caribbean Sea, *Master Michael spill

The Cypriot motor asphalt carrier Master Michael sank in heavy seas on 2 January 1979 and its 5600 tons of diesel fuel oil have begun leaking into the Caribbean.

79A-0332
SPILL CLEANUP CONTINUES IN BANTRY BAY [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(3):1.

Tankers, Spill cleanup, Oil spills, Dispersants, Ireland, *Bantry Bay, *Betelgeuse spill

Spill cleanup efforts continued around the Gulf Oil Co. terminal at Whiddy Island in Bantry Bay, Ireland, following the explosion of the French tanker Betelgeuse on 8 January 1979. Booms, skimmers, sorbents, and vacuum pumps have been used to clean up the spilled oil; a monoplane was used to apply dispersants, although local fishermen opposed their use.

79A-0333
SPILL CLEANUP CONTINUES IN CHARLESTON, SOUTH CAROLINA
Anon. 1978.
Oil Spill Intelligence Report 1(12):2.

Spill cleanup, Rivers, USCG, Marshes, Tankers, Fuel oil, South Carolina

An estimated total of 57,000 L (15,000 gal) of fuel oil spilled into the Cooper River near Charleston, South Carolina on 3 December 1978 as a result of a cargo tank overflowing on the US tanker Aries. The USCG has assumed responsibility for cleaning up the spill, which impacted 5 km of river banks, rip-rap, seawalls and marshes.

H. RECENT POLLUTION INCIDENTS

79A-0334
STORAGE TANK SPILLS OIL IN BENUELAN, PUERTO RICO [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(12):1.

Oil spills, Oil tanks, Puerto Rico, Contamination, Beaches, Refineries

About 39.7 million L (10.5 million gal) of No. 6 fuel oil spilled into a containment dike at a refinery in Puerto Rico, after a storage tank ruptured on 14 December 1978. About half of the oil overflowed the dike, spilling into a storm drainage system. Eventually, up to 2,300 L (600 gal) drained into Talloba Bay, contaminating about 1.5 km of industrial beach. Cleanup was expected to be complete by late December, and no impact to wildlife was apparent.

79A-0335
STORMS THWART *CADIZ* SALVAGE BUT DISSIPATE SPILL [news brief]
Anon. 1978.
Oil and Gas Journal 76(14):38.

Tankers, *Amoco Cadiz* spill, Spreading, Coasts, France

By late March 1978, the wrecked *Amoco Cadiz* supertanker had spilled most of its 66 million bbl of oil, making it the biggest oil spill in history. At one time the slick covered an area of several hundred kilometers and was threatening to spread to English beaches, but continual storms caused most of the oil to impact against well over 100 km of Breton coast.

79A-0336
SWEDISH TANKER SPILLS HEAVY FUEL OIL AFTER GROUNDING [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(5):3.

Oil spills, Tankers, Fuel oil, Shorelines, Ice, Birds, Mortality, Denmark, **Thuntank 3* spill

An estimated 400 tons of heavy fuel oil spilled from the Swedish tanker, *Thuntank 3*, after it grounded on Hatter Reef in a narrow strait near Samso on 20 January 1979. The oil spill threatened 22 km along the eastern shoreline of Helganaes, Denmark, but the ice cover initially protected the shoreline. An estimated 10,000-20,000 birds died from oiling and hypothermia; 90% of the birds were scoter and eider ducks.

H. RECENT POLLUTION INCIDENTS

79A-0337
TUG GROUNDS AND SPILLS OIL IN SCOTLAND HARBOR [news brief]
Anon. 1979.
Oil Spill Intelligence Report 2(5):1.

Oil spills, Ships, Fuel oil, Harbors, Beaches, Scotland

A fuel tank ruptured on the Dutch motor supply tug Smit-Lloyd 47 and spilled 200 tons of light fuel oil in Peterhead Harbor, Scotland, on 19 January 1979, after the ship ran aground on rocks. Most of the spilled oil evaporated or broke up rapidly due to wave action; however, some washed onto 100 m of shoreline and mixed with the sand.

79A-0338
WEST HAVEN CLEANUP CONTINUES AFTER 16 MONTHS [news brief]
Anon. 1978.
Oil Spill Intelligence Report 1(10):2.

Spill cleanup, Fuel oil, Pipelines, Liability, USCG, Connecticut, *West Haven spill

Spill cleanup and recovery of No. 2 fuel oil continues 16 months after an underground oil pipeline was damaged during construction of a West Haven, Connecticut school. Oil seeped into the ground from October 1976 until summer 1977 when it began to flow from a storm drain into Long Island Sound. About 160,000 L (45,000 gal) of oil have been recovered by USCG contractors; the USCG is currently attempting to assign responsibility and liability for the $200,000 costs incurred thus far.

I. MISCELLANEOUS

79A-0339
NORWEGIAN OFFSHORE RESEARCH
Anon. 1977.
Northern Offshore 6(7-8):32-33, 35-41.

Design-engineering, Equipment, Spill cleanup, Booms, Sorbents, Monitoring, Norway

Norwegian applied research projects are discussed. Projects at the Ship Research Institute of Norway include the development of several types of oil booms; projects at the Chr. Michelson Institute include establishing a network of automatic telemetry buoys in the North Sea and the Norwegian Sea for collecting data. A magnetic sponge for picking up oil spills is also being tested.

[from Oceanic Abstracts 15(3):#78-03846. 1978]

79A-0340
SEABIRD REMOTE SENSING PROPOSED [news brief]
Anon. 1978.
Sea Technology 19(7):31.

Remote sensing, Monitoring, Birds, Alaska, OCS, *Seabirds, *Spill response

Detailed seabird monitoring in the vast remote regions of the Alaska OCS is being considered as necessary not only for a better understanding of their part in the marine ecosystem, but also for response in case of oil spills. Two remote sensing alternatives have been suggested: one would use SEASAT radar to monitor concentrations of birds; the second would monitor relationships between seabirds and their environment, such as sea surface temperatures and chlorophyl densities, in order to keep track of them.

79A-0341
SOURCE CONTROL IN PETROLEUM REFINERIES
Knowlton, H.E. 1978.
National Petroleum Refiners Association, Technical paper AM-78-41. 19 p.

Refineries, Equipment, Monitoring, Pollution control, *Source control, *Waste treatment

"Source control is controlling an environmental problem at the source. It is applicable to refinery water, air, and solid waste problems. Implementation, monitoring, and operating and equipment changes of source control are discussed."

[from Chemical Abstracts 89(12):#91966w. 1978]

I. MISCELLANEOUS

79A-0342
NEW SLANT ON ENVIRONMENTAL ISSUES
Tubb, M. 1978.
Ocean Industry 13(11):51-54, 56.

Environmental effects, Contamination, Chronic effects, Liability, Compensation, Regulations, Legislation, *Conference panel discussion

Presented in an interview format are the comments of Drs. D. Straughan, G.V. Cox, and N. Maynard, who were panel members of a round table discussion held at the Conference on the Assessment of the Ecological Impacts of Oil Spills (June 1978, Keystone, Colorado). The panel discussion examined the threat of oil vs. other hazardous pollutants, nonpoint pollution sources in the marine environment, long-term, low-level pollution, oil spill liability and compensation legislation, and oil-related government regulations.

SECTION II

CURRENT RESEARCH PROJECTS

Title, contract information, and a summary of project objectives are provided in each entry. Sources of project notices include: The Smithsonian Science Information Exchange (SSIE); API Environmental Research Annual Status Report; Maritime Research Information Service Abstracts, Scientific and Technical Aerospace Reports; Department of Environment, Canada, Spill Technology Newsletter; Northwest and Alaska Fisheries Center Monthly Report; and written inquiries to organizations and researchers. Current status inforamtion and publications resulting from the projects are presented when such information is available from the principal investigators or performing organizations. The source of status information is given at the end of each entry.

Entries are grouped according to subject and then ordered sequentially with a citation number 79A-R___. Some of the projects listed in previous Oil Pollution Reports have been recently renewed. These projects have been relisted with a current serial number, followed by the original number in parentheses. To locate the original entry, refer to the following list:

Citation Numbers		Dates Covered	Report Number
R-001-74 to R-165-74		July 74 - Oct. 74	EPA-670/2-75-003
R-166-74 to R-244-74		Nov. 74 - Feb. 75	EPA-670/2-75-044
R-245-74 to R-268-74		Feb. 75 - Apr. 75	EPA-670/2-75-059
R-269-74 to R-342-74		May 75 - July 75	EPA-600/2-76-129
R-269-75 to R-304-75		Aug. 75 - Oct. 75	EPA-600/2-76-113
R-001-76 to R-035-76		Nov. 75 - Jan. 76	EPA-600/2-76-185
R-036-76 to R-063-76		Feb. 76 - Apr. 76	EPA-600/2-76-215
R-064-76 to R-123-76		May 76 - July 76	EPA-600/2-76-266
R-124-76 to R-175-76		Aug. 76 - Oct. 76	EPA-600/2-77-037
R-001-77 to R-022-77		Nov. 76 - Jan. 77	EPA-600/2-77-075
R-023-77 to R-039-77		Feb. 77 - Apr. 77	EPA-600/2-77-111
R-040-77 to R-075-77		May 77 - July 77	EPA-600/2-77-243
R-076-77 to R-096-77		Aug. 77 - Oct. 77	EPA-600/2-78-005
R-001-78 to R-020-78	5(1)	Nov. 77 - Jan. 78	EPA-600/2-78-071
R-021-78 to R-057-78	5(2)	Feb. 78 - May 78	EPA-600/7-78-160
R-058-78 to R-150-78	5(3)	Jun. 78 - Sep. 78	EPA-600/7-78-218
R-151-78 to R-200-78	5(4)	Oct. 78 - Dec. 78	EPA-600/7-79-040

A. OIL POLLUTION DETECTION AND EVALUATION

1. Detection and Monitoring

79A-R001 (R-048-78)
CULTURE OF MARINE ALGAE FOR EXPERIMENTAL USE

Principal Investigator:	Steele, R.L.
Performing Organization:	US Environmental Protection Agency, Environmental Research Lab., S. Ferry Rd., Narragansett, RI 02882
Supporting Organization:	US Environmental Protection Agency, Office of Research and Development, Environmental Research Lab., S. Ferry Rd., Narragansett, RI 02882
Period:	6/76 - 6/79
Funds:	$45,600 FY 77

Algae, Hydrocarbons, Petroleum products, Detection, Toxicity, Bioassay, Bioindicators

Selected macro-algae were cultured for use as bioassay organisms to detect toxic levels of oil, oil products, and other pollutants. Levels of sensitivity have been determined for two species: Fucus edentatus and Laminaria saccharina. Brown algae with different life cycles are also to be tested.

[SSIE No. ZMA-1184]

2. Remote Sensing

79A-R002
AERIAL REMOTE SENSOR DATA COLLECTION PROCESSING AND ANALYSIS FOR ENVIRONMENTAL MONITORING

Principal Investigator:	Clawson, F.G.
Performing Organization:	US Environmental Protection Agency, Environmental Monitoring & Support Lab., Las Vegas, NV 89114
Supporting Organization:	US Environmental Protection Agency, Office of R & D, Environmental Monitoring & Support Lab., Las Vegas, NV 89114
Period:	Unknown
Funds:	Unknown

Remote sensing, Detection, Monitoring, Oil spills, Equipment, *Spill response

A. OIL POLLUTION DETECTION AND EVALUATION

Among the objectives of this project are the development of electroptical instruments for remote detection and measurement of specific physical and chemical pollutants, and provision of remote sensing data required in oil and hazardous material spill response situations.

79A-R003

AERIAL REMOTE SENSOR DATA COLLECTION PROCESSING AND ANALYSIS FOR ENVIRONMENTAL MONITORING

Principal Investigator:	Donaldson, J.R.
Performing Organization:	Lockheed Electronics Co., Inc., Las Vegas, NV 89114
Supporting Organization:	US Environmental Protection Agency, Office of R & D, Environmental Monitoring & Support Lab., Las Vegas, NV 89114
Period:	Unknown
Funds:	Unknown

Remote sensing, Detection, Monitoring, Equipment, Oil spills, *Spill response

This is one of a multi-part project whose objectives include the development of instruments for remote detection and measurement of physical and chemical pollutants, and provision of remote sensing data required in oil and hazardous material spill response situations.

B. OIL POLLUTION PREVENTION AND CONTROL

1. Containment

79A-R004 (R-138-78, R-026-77)
OIL SLICK CONTROL IN OFFSHORE ENVIRONMENTS

Principal Investigator:	Milgram, J.H.
Performing Organization:	Massachusetts Institute of Technology, School of Engineering, 77 Massachusetts Ave., Cambridge, MA 02139
Supporting Organization:	NOAA, National Sea Grant Program, Washington, DC 20235
Period:	10/76 - ?/79
Funds:	Unknown

Spill containment, Spill cleanup, Oil slicks, Models, Contingency planning

The result of laboratory experiments on oil pollution hydrodynamics will be a plan for oil slick control and cleanup in currents and waves typical of offshore environments.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

79A-R005 (R-115-78)

ENVIRONMENTAL AND ECOLOGICAL STUDIES OF HIGH ARCTIC MAMMALIAN HABITAT AND FOOD CHAINS AFFECTED BY DEVELOPMENT

Principal Investigator: Jonkel, C.J.

Performing Organization: University of Montana, School of Forestry, Missoula, MT 59801

Supporting Organization: US National Science Foundation, Division of Polar Programs, 1800 G St. NW, Washington, DC 20550

Period: 10/76 - 9/79

Funds: $233,000 FY 76, $111,000 FY 77

Development, Pipelines, Biological effects, Arctic, Mammals, Food web, Habitats, Environmental effects

This international research project with US, Canadian, Danish, Norwegian, and Soviet scientists is focused on discerning the effect of resources, pipeline, and shipping development pressures on key mammal species, their habitats, and food chains in high arctic regions. The predators selected for study are at the top of the arctic food chain and, therefore, serve as good indicators of the status of the arctic environment.

[SSIE No. CF-829-1]

79A-R006 (R-059-77)

EFFECTS OF PETROLEUM COMPOUNDS ON ESTUARINE FISHES

Principal Investigator: Martin, B.J., and H.D. Howse.

Performing Organization: University of Southern Mississippi, School of Science & Technology, Hattiesburg, MS 39401

Supporting Organization: US Environmental Protection Agency, Office of R & D, Gulf Breeze Environmental Research Lab., Sabine Island, Gulf Breeze, FL 32561

Period: 6/76 - 10/78

Funds: $25,000 FY 77

Carcinogens, Fish, Hydrocarbons, Bioindicators, Aquatic environment, Biological effects, Estuaries, *Benzopyrene

The purpose of this project is to study chemically induced tumors in teleost fishes. Tissues from the liver, kidney, intestine, and gills of fish exposed to low levels of a known carcinogen will be studied histologically. This research will provide data concerning the quantities of benzopyrene necessary to induce neoplasias, establish the feasibility of using teleost fish as early indicators of carcinogenic substances in the aquatic environment, and demonstrate the cost effectiveness of this type of system.

[SSIE No. GMA-3065-1]

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C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

79A-R007

TOXIC, SUBLETHAL AND LATENT EFFECTS OF SELECTED PETROLEUM HYDROCARBONS AND BARIUM SULFATE ON MARINE ORGANISMS

Principal Investigator: Rao, R.R.
Performing Organization: State University of Florida System, Graduate School, Pensacola, FL 32504
Supporting Organization: US Environmental Protection Agency, Office of R & D, Gulf Breeze, Environmental Research Lab., Sabine Island, Gulf Breeze, FL 32561
Period: 5/76 - 7/79
Funds: $85,000 FY 77

PAH, Hydrocarbons, Uptake, Toxicity, Sublethal effects, Growth, Respiration, *Histology, Fish, Invertebrates, *Autoradiography

The uptake and accumulation of PAHs and barium sulfate in selected fish and invertebrates will be studied using autoradiographic and conventional analytical methods. The effects of these pollutants on crustacean molt cycles, regenerative limb growth, respiration, heart rate, and histology and ultrastructure of tissues will be determined.

[SSIE No. GMA-2794-1]

2. Baseline and Environmental Impact Studies

79A-R008

ENVIRONMENTAL ASSESSMENT OF NORTHERN PUGET SOUND AND THE STRAIT OF JUAN DE FUCA

Principal Investigator: Harris, H.S., E.R. Long, and R. Kopenski
Performing Organization: US Dept of Commerce, NOAA, 6010 Executive Blvd., Rockville, MD 20852
Supporting Organization: US Environmental Protection Agency, Office of Energy, Minerals & Industry, 401 M St. SW, Washington, DC 20460
Period: 9/75 - 9/80
Funds: $963,000 FY 77

Baseline studies, Environmental effects, Hydrocarbons, Ecosystems, Development, Refineries, Tankers, Ports, Oil spills, Models, Spill trajectories, Puget Sound

This study will provide: "1) a detailed characterization of the major marine biological populations at risk, 2) a description of the physical and chemical processes which transport petroleum hydrocarbons through the ecosystem, 3) a baseline of the present occurrence and variability of petroleum hydrocarbons in the marine ecosystem, and 4) a state-of-the-art oil spill trajectory model for northern Puget Sound and the Strait of Juan de Fuca." The data generated by the project will be used for management decisions concerning development of oil resources in the title areas, and for assessing the potential impact of major oil spills and chronic oil discharges on the ecosystem.

[SSIE No. GMA-4683]

D. FATE OF OIL IN THE ENVIRONMENT

1. Physical and Chemical Processes

79A-R009 (R-137-78)
OIL SLICK DISPERSION
Principal Investigator: Donnelly, R.G.
Performing Organization: Massachusetts Institute of Technology, Dept. of Chemical Engineering, Cambridge, MA 02139
Supporting Organization: NOAA, National Sea Grant Program, Washington, DC 20235
Period: 10/76 - 7/79
Funds: Unknown

Oil slicks, Dispersion, Emulsions, Chemical effects, Physical effects, *Wave action

Specific objectives of the project are to 1) determine the role of relatively stable oil/water emulsions as a dispersion mechanism and as a function of the physical, chemical and colloidal properties of the oil and ambient water, 2) design and conduct small-scale simulated wave and slick experiments, 3) assess wave action inducement of stable oil/water emulsion formation for several natural oils, and 4) develop a synthetic oil for future experiments.

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Guide to the Master List of Keywords and the Subject Keyword Index

The following Master List of Keywords is a controlled list of approximately 400 scientific, technical, geographic, and other descriptive terms relevant to the field of oil pollution. For each literature abstract and research project summary contained in this issue, a string of several terms has been selected from this list to serve as a reference guide to each entry. The Master List is continually updated to reflect common word usage and current trends in the pertinent literature and research. When necessary, additional free-language terms are assigned to more thoroughly define the subject coverage of an entry; such terms are preceded by an asterisk (*).

The terms included in the Master List are alphabetically permuted by computer to form the Subject Keyword Index. Thus, the string of keywords for each abstract is listed in all possible alphabetical arrangements to provide rapid access to, and cross-referencing of, any entry in this issue. The free-language terms (*) are not alphabetically permuted.

To effectively use the permuted Subject Keyword Index, the reader should use the following procedure: 1) Scan the Master List of Keywords and Cross-Reference Guide to determine all possible terms and word variants applicable to the topic of interest; 2) look up all terms in the permuted Subject Keyword Index and scan the other keywords in each entry to determine the relevancy of the entry; and 3) note the citation numbers of relevant entries and locate them in the body of the ABSTRACTS. Citation numbers prefixed with the letter R denote research project summaries.

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MASTER LIST OF KEYWORDS AND CROSS REFERENCE-GUIDE TO RELATED TERMS

S: See
SA: See also

- Absorption
  - SA: Adsorption, Sorbents
- Activated sludge
  - SA: Sludge
- Acute effects
  - SA: Biological effects
- Adsorption
  - SA: Absorption, Sorbents
- Africa
- Alabama
- Alaska
- Algae
  - SA: Phytoplankton
- *Amoco Cadiz* spill
- Amphipods
- Analytical techniques
  - SA: Chemical analysis, Chromatography, Detection, Source identification
- Animals
  - SA: Invertebrates, Marine mammals, Marine organisms, Vertebrates
- Annelids
  - SA: Polychaetes
- Antarctica
- API (American Petroleum Institute)
- Aquatic Environment
  - SA: Marine environment
- Arctic
  - SA: Subarctic regions
- Arctic Ocean
- Argentina
- *Argo Merchant* spill
- Aromatic hydrocarbons
  - SA: Hydrocarbons, PAH
- Asia
- Atlantic coast
- Atlantic Ocean
- Australia
- Bacteria
  - SA: Microorganisms
- Bahamas
- Ballast
- Baltic Sea
- Barent Sea
- Baseline studies
  - SA: EIS
- Bays
  - SA: Estuaries, Harbors
- Beach cleanup
- Beaches
  - SA: Coasts, Intertidal zone, Shorelines
- Beaufort Sea
- Behavior
  - SA: Fate
- Belgium
- Benthos
  - SA: Invertebrates, Marine organisms
- Bering Sea
- Bermuda
- Bibliographies
- Bilges
  - SA: Tankers, Ships
- Bioassay
- Biodegradation
- Biogenic hydrocarbons
  - SA: Hydrocarbons
- Bioindicators
- Biological effects
  - SA: Acute effects, Chronic effects, Toxicity
- Biological treatment
  - SA: Wastewater treatment
- Biomass
- Birds
- Black Sea
  - SA: USSR
- BLM (Bureau of Land Management)
- Blowout prevention
- Blowouts
- Book review
- Booms
  - SA: Spill containment
- *Bouchard 65* spill
- Brazil
- Buzzards Bay
  - SA: Massachusetts

- California
  - SA: Pacific Coast
- Canada
- Carcinogens
  - SA: Health hazards, PAH
- Caribbean Sea
- Caspian Sea
  - SA: USSR
- Chedabucto Bay
  - SA: Canada
- Chemical analysis
  - SA: Analytical techniques, Detection, Source identification
- Chemical effects
- Chesapeake Bay
  - SA: Maryland
- Chile
- China
- Chromatography
  - SA: Analytical techniques, Chemical analysis
- Chronic effects
  - SA: Biological effects
- Coalescence
  - SA: Flocculation
- Coastal waters
- Coastal zone management
- Coasts
  - SA: Beaches, Coastal waters, Shorelines
- Compensation
  - SA: Liability
- Concentrations
  - SA: Detection, Chemical analysis
- Connecticut
- Conservation
- Containment
  - S: Booms, Spill containment
- Contaminants
- Contamination
- Contingency planning
- Corals
- Coral reefs
- Cost analysis
  - SA: Economics
- Crankcase oil
  - SA: Lubricating oil
- Crude oil
  - SA: Petroleum products
- Crude oil washing
- Crustaceans
- Decomposition
- Deepwater ports
  - SA: Harbors, Oil terminals, Ports
- Delaware
- Delaware Bay
- Demulsification
- Denmark
- Design-engineering
  - SA: Equipment, Product information
- Detection
  - SA: Chemical analysis, Monitoring, Source identification
- Development
  - SA: Offshore development
- Dispersants
  - SA: Emulsifiers, Surfactants
- Dispersion
  - S: Drift, Movement, Spreading
- Dispersions
  - S: Emulsions
- Disposal
  - SA: Waste oil disposal, Wastewaters
- Distillation
- Distribution
- DOE (Department of Energy)
- Drift
  - SA: Movement, Spreading
- Drilling
  - SA: Offshore drilling, Oil wells, Platforms
- Echinoderms
- Economic effects
- Economics
  - SA: Cost analysis
- Ecosystems
- Ecuador
- Effluents
  - S: Wastewaters
- Effluent treatment
  - S: Wastewater treatment
- EIS (Environmental Impact Statement)
  - SA: Baseline studies
- Ekofisk blowout
- Emulsification
- Emulsifiers
  - SA Dispersants, Surfactants
- Emulsions
- Engineering
  - S: Design-engineering
- England
  - SA: UK

- English Channel
- Environmental deterioration
- Environmental effects
- Environmental Impact Statement
  - S: EIS
- Environmental management
  - SA: Coastal zone management
- Environmental protection
- EPA (Environmental Protection Agency)
- Equipment
  - SA: Product information
- ERDA (Energy Research and Development Administration)
  - SA: DOE
- Estuaries
  - SA: Bays
- Europe
- Evaporation
- Exploration
  - SA: Offshore exploration, Production
- Extraction
- Fate
  - SA: Behavior
- FEA (Federal Energy Administration)
- Filtration
  - SA: Flocculation, Ultrafiltration
- Finland
- Fish
- Fisheries
- Flocculation
  - SA: Coalescence, Filtration
- Florida
- Florida spill
- Flotation
- Food chain
  - S: Food web
- Food web
- Foreign governments
  - S: Government agencies
- Fossil fuels
- France
- Freshwater
- Fuel oil
- Fuels
- Fungi
  - SA: Microorganisms
- Gas-liquid chromatography
  - S: Chromatography
- Gasoline
- GC/MS (Gas chromatography/mass spectrometry
  - SA: Analytical techniques, Chemical analysis, Chromatography, Spectrometry
- Georges Bank
- Georgia
- Germany, East
- Germany, West
- Government agencies
  - SA: BLM, DOE, EPA, ERDA, FEA, NOAA, USCG, USGS, USN; Foreign governments, State governments, US Government
- Gravity separation
  - SA: Oil-water separation, Wastewater treatment
- Great Lakes
- Greenland
- Groundwater
- Growth
- Guidelines
  - SA: Manual, Regulations
- Gulf of Alaska
- Gulf of Mexico
- Habitats
  - SA: Ecosystems, Niches
- Harbors
  - SA: Bays, Deepwater ports, Oil terminals
- Health hazards
  - SA: Carcinogens
- Hydrocarbons
  - SA: Aromatic hydrocarbons, Biogenic hydrocarbons, Crude oil, PAH, WSF
- Ice
- Illinois
- IMCO (International Maritime Consultative Organization)
- Incineration
- India
- Indian Ocean
- Indonesia
- Industries
  - SA: Oil industry, Petrochemicals
- Information systems
- Infrared spectroscopy
  - S: Spectroscopy
- Inland
  - SA: Onshore impacts
- Insurance
  - SA: Compensation
- International agreements
  - SA: Foreign governments

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International conventions
  SA: Foreign governments, Legislation, Regulations
Intertidal zone
  SA: Beaches, Shorelines
Invertebrates
  SA: Marine organisms
Iran
Iraq
Ireland
Israel
Italy
Japan
Kuwait
Labrador Sea
Lakes
  SA: Great Lakes
Land farming
  SA: Waste oil disposal
Law enforcement
Leakage
  SA: Oil discharges
Legislation
  SA: International conventions, Regulations
Liability
  SA: Compensation
Louisiana
Lubricating oil
  SA: Crankcase oil
Maine
Manuals
  SA: Guidelines
Marine environment
  SA: Aquatic environment
Marine mammals
  SA: Animals, Vertebrates
Marine organisms
Marshes
Maryland
Massachusetts
Mass spectroscopy
  S: Spectroscopy
Mediterranean Sea
Metabolism
  SA: Growth, Release, Uptake
Metula spill
  SA: Strait of Magellan
Mexico
Michigan
Microorganisms
  SA: Algae, Bacteria, Fungi, Yeasts
Middle East
Mississippi
Mississippi River
Models
  SA: Predictions
Mollusks
  SA: Invertebrates
Monitoring
  SA: Detection, Remote sensing, Sampling, Surveillance
Mortality
Movement
  SA: Drift, Spreading
Narragansett Bay
  SA: Massachusetts
Natural seepage
Neuston
New Hampshire
New Jersey
New Mexico
New York
Niches
  SA: Habitats
NOAA (National Oceanic and Atmospheric Administration)
North Carolina
North Sea
Norway
Oceans
  SA: Sea surface, Seawater
OCS (Outer Continental Shelf)
Offshore development
Offshore drilling
Offshore exploration
Offshore production
Oil
  S: Crankcase oil, Crude oil, Fuel oil, Lubricating oil, Petroleum products, Waste oil
Oil discharges
  SA: Leakage
Oil fields
  SA: Production
Oil-gas leasing
Oil industry
  SA: Refineries
Oil removal
Oil shale
Oil slicks
Oil spills
Oil sands
  S: Tar sands

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- Oil tanks
  - SA: Storage
- Oil terminals
  - SA: Deepwater ports, Harbors, Oil transfer, Ports
- Oil transfer
  - SA: Harbors, Ports
- Oil transport
  - SA: Pipelines, Tankers
- Oil-water separation
  - SA: Wastewater treatment, Waste oil treatment
- Oil wells
  - SA: Drilling, Production, Offshore drilling, Offshore production
- *Olympic Games* spill
- Onshore impacts
  - SA: Inland
- Oregon
- Oxidation
  - SA: Biodegradation, Weathering
- Pacific coast
- Pacific Northwest
- Pacific Ocean
- PAH (Polycyclic aromatic hydrocarbons)
  - SA: Hydrocarbons
- Patent
- Pennsylvania
- Persian Gulf
- Personnel training
- Petrochemicals
- Petroleum
  - S: Crude oil
- Petroleum industry
  - S: Oil industry, Refineries
- Petroleum products
  - SA: Crude oil, Fuel oil, Fuels, Gasoline, Lubricating oil
- pH control
- Philippines
- Physical effects
- Phytoplankton
  - SA: Plankton
- Pipelines
  - SA: Oil transport, Oil transfer
- Plankton
  - S: Phytoplankton, Zooplankton
- Plants
  - SA: Vegetation
- Platforms
  - SA: Offshore drilling
- Pollution control
- Pollution prevention
  - SA: Environmental protection, Contingency planning
- Polychaetes
  - SA: Annelids
- Ports
  - SA: Deepwater ports, Harbors, Oil terminals
- Portugal
- Precipitation
  - SA: Sedimentation
- Predictions
  - SA: Models
- Product information
  - SA: Equipment
- Production
  - SA: Offshore production, Drilling, Offshore drilling
- Prudhoe Bay
  - SA: Alaska
- Puerto Rico
- Puget Sound
  - SA: Pacific Northwest, Washington
- Reclamation
  - SA: Recycling, Reuse
- Recovery
  - SA: Restoration
- Recycling
  - SA: Reclamation, Reuse
- Red Sea
- Refineries
  - SA: Oil industry
- Refining
- Regulations
  - SA: Legislation, International conventions
- Release
  - SA: Growth, Metabolism, Uptake
- Remote sensing
  - SA: Detection, Monitoring, Surveillance
- Reproduction
- Residual oils
  - SA: Waste oil
- Resource management
  - SA: Environmental management, Costal zone management
- Restoration
  - SA: Recovery
- Reuse
  - SA: Reclamation, Recycling

Rhine River
Rhode Island
Risk analysis
Rivers
  SA: Streams
Safety
  SA: Health hazards
Sampling
  SA: Detection, Monitoring, Source identification
San Francisco Bay
  SA: California
Santa Barbara Channel
  SA: California
Sansinena spill
Sargasso Sea
Saudi Arabia
Scotland
  SA: UK
Seabirds
  S: Birds
Sea surface
  SA: Oceans, Seawater
Seawater
  SA: Oceans, Sea surface
Sedimentation
Sediments
Segregated ballast
  SA: Ballast
Ships
  SA: Tankers
Shorelines
  SA: Beaches, Coasts
Sinking agents
Skimmers
  SA: Spill cleanup
Sludge
  SA: Activated sludge, Solid wastes
Social effects
Socioeconomc effects
Soil
Solid wastes
  SA: Sludge
Solubility
Solution
Solvents
Sorbents
  SA: Absorption, Adsorption
Source identification
  SA: Detection
Sources
South Carolina
Spain
Spectrometry
  SA: Analytical techniques, Chemical analysis
Spectroscopy
  SA: Analytical techniques, Chemical analysis
Spill cleanup
Spill containment
Spill disposal
Spill removal
Spill trajectory
Spreading
  SA: Drift, Movement
St. Lawrence River
State governments
  SA: Government agencies
Statistical analysis
Statistics
Storage
  SA: Oil tanks
Strait of Gibraltar
  SA: Mediterranean Sea
Strait of Magellan
Strategic Petroleum Reserve
Streams
  SA: Rivers
Subarctic regions
  SA: Arctic
Sublethal effects
  SA: Biological effects
Superports
  S: Deepwater ports, Oil terminals, Ports
Supertankers
  S: Tankers
Surfactants
  SA: Dispersants, Emulsifiers
Surveillance
  SA: Monitoring, Remote sensing
Sweden
Syria
Tankers
  SA: Ships
Tar
Tar sands
Texas
Torrey Canyon spill
Toxicity
  SA: Biological effects
Trans-Alaska Pipeline

- Tropical regions
- Turkey
- UK (United Kingdom)
- Ultrafiltration
  - SA: Filtration
- UN (United Nations)
- Uptake
  - SA: Growth, Metabolism, Release
- Urquiola spill
- US (United States)
- USCG (US Coast Guard)
- US Government
  - SA: Government agencies
- USGS (US Geological Survey)
- USN (US Navy)
- USSR (Union of Soviet Socialist Republics)
- Vegetation
  - SA: Plants
- Venezuela
- Vertebrates
  - SA: Animals, Marine mammals
- Vietnam
- Virgin Islands
- Virginia
- Washington
- Waste oil
  - SA: Residual oils
- Waste oil disposal
- Waste oil treatment
- Wastewaters
- Wastewater treatment
  - SA: Oil-water separation
- Waterfowl
  - S: Birds
- Water quality
- Water soluble fraction
  - S: WSF
- Weathering
- West Indies
- Wildlife
- WSF (Water soluble fraction)
  - SA: Solution
- Yeasts
  - SA: Microorganisms
- Yugoslavia
- Zooplankton
  - SA: Plankton

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SUBJECT KEYWORD INDEX

0058 ABSORPTION, SPILL CLEANUP, REUSE, DISPERSANTS, SORBENTS, *POLYURETHANE FOAM
0062 * SORBENTS, SPILL CLEANUP, CRUDE OIL, CRANKCASE OIL, *REFINED OIL, *RECLAIMED RUBBER PARTICLES
0196 * HYDROCARBONS , AROMATIC HYDROCARBONS, FATE, EVAPORATION, BIODEGRADATION, WEATHERING, OCEANS, *PELAGIC WATERS
0283 * WASTEWATER TREATMENT, SORBENTS, PATENT, *POLYURETHANE FOAM
0298 * OIL-WATER SEPARATION, WASTEWATERS, SORBENTS, OIL REMOVAL, PATENT
0108 ACUTE EFFECTS, WSF, ALGAE, TOXICITY, ENVIRONMENTAL EFFECTS, BIOLOGICAL EFFECTS, CHRONIC EFFECTS, FUEL OIL, CRUDE OIL, CRANKCASE OIL, BIOMASS
0131 * TOXICITY, HYDROCARBONS , PETROLEUM PRODUCTS, SOLVENTS, BIOASSAY, BIOLOGICAL EFFECTS, METABOLISM, *ALKALINE PHOSPHATASE, *LIPID PEROXIDATION
0030 ADSORPTION, DETECTION, ANALYTICAL TECHNIQUES, HYDROCARBONS , SPECTROSCOPY, SOURCE IDENTIFICATION, *MOLECULAR SIEVE 5A
0076 * SPILL CLEANUP, SPILL REMOVAL, PATENT, *SAWDUST, *PARAFFIN
0077 * SPILL CLEANUP, SPILL REMOVAL, PATENT, *CLOTH, *PARAFFIN
0259 * OIL REMOVAL, WASTEWATERS, SORBENTS, PATENT
0260 * WASTEWATER TREATMENT, SORBENTS, WASTEWATERS, PATENT
0275 * WASTEWATER TREATMENT, SORBENTS, OIL-WATER SEPARATION, OIL REMOVAL, PATENT
0168 AFRICA, CONTAMINATION, MARINE ENVIRONMENTS, *SOUTH SAMPLING, DISTRIBUTION
0146 ALASKA , OIL SPILLS, FATE, DISPERSION, DECOMPOSITION, PREDICTION, CONTINGENCY PLANNING, SHORELINES, ENVIRONMENTAL EFFECTS, OFFSHORE DEVELOPMENT, *COOK INLET
0147 * CRUDE OIL, INTERTIDAL ZONE, MARINE ORGANISMS, BEACHES, SEDIMENTS, BIOLOGICAL EFFECTS, FATE, PHYSICAL EFFECTS, *TIDAL FLATS
0152 * BASELINE STUDIES, CONSERVATION, BIRDS, WILDLIFE, HABITATS, ENVIRONMENTAL EFFECTS, OFFSHORE DEVELOPMENT, RESOURCE MANAGEMENT, OIL SPILLS, *ANSER CANAGICUS
0163 * BASELINE STUDIES, OCS, NOAA, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, BEAUFORT SEA, *ECOSYSTEM PROCESS ANALYSIS
0185 * BIODEGRADATION, MICROORGANISMS, HYDROCARBONS , DISTRIBUTION, BASELINE STUDIES, *BIODEGRADATION POTENTIAL, OCS, GULF OF ALASKA, BEAUFORT SEA
0190 * MODELS, FATE, BEHAVIOR, OIL SLICKS, ARCTIC, ICE, PRUDHOE BAY, OFFSHORE DEVELOPMENT, NOAA, *OCSEAP
0194 * MOVEMENT, DISPERSION, OIL SPILLS, MODELS, FATE, SPILL TRAJECTORIES, COASTAL WATERS, PREDICTIONS, *WIND FIELDS
0211 * INLAND, DEVELOPMENT , EIS, US GOVERNMENT, *DEVELOPMENT BAN
0217 * OIL TERMINALS, OIL TRANSPORT, OIL INDUSTRY, PIPELINES, REGULATIONS, SOCIAL EFFECTS, *PUBLIC ACTION
0221 * DRILLING , BIOLOGICAL EFFECTS, PHYSICAL EFFECTS, BIOASSAY, SAMPLING, DISTRIBUTION, MARINE ORGANISMS
0223 * ERDA, GOVERNMENT AGENCIES, OFFSHORE DEVELOPMENT, ENVIRONMENTAL EFFECTS, *ENVIRONMENTAL RESEARCH PROGRAMS, *PASS-THROUGH PROGRAM
0312 * SHIPS, OIL SPILLS, FUEL OIL, USCG, NOAA, USN, *GLACIER QUEEN FERRY SPILL
0340 * REMOTE SENSING, MONITORING, BIRDS, OCS, *SEABIRDS, *SPILL RESPONSE
0028 ALGAE, TOXICITY, MORTALITY, PHYTOPLANKTON, BIOASSAY, DISPERSANTS, *POPULATION GROWTH RATES, *CHLAMYDOMONAS, *COREXIT 9527
0107 * WSF, CRUDE OIL, FUEL OIL, TOXICITY, *MICROALGAE, *PH, *PHOTOSYNTHESIS, *O2 EVOLUTION, BIOLOGICAL EFFECTS, SUBLETHAL EFFECTS
0108 * ACUTE EFFECTS, WSF, TOXICITY, ENVIRONMENTAL EFFECTS, BIOLOGICAL EFFECTS, CHRONIC EFFECTS, FUEL OIL, CRUDE OIL, CRANKCASE OIL, BIOMASS
0116 * DISPERSANTS, TOXICITY, BIOLOGICAL EFFECTS, *CHLAMYDOMONAS REINHARDTI, *DUNALIELLA MARINA
0123 * PETROLEUM PRODUCTS, TOXICITY, GROWTH, *PHOTOSYNTHESIS, BIOLOGICAL EFFECTS, *BLUE-GREEN ALGAE
0167 * BIODEGRADATION, MICROORGANISMS, HYDROCARBONS , *PROTOTHECA, *HYDROCARBON UTILIZATION
R001 * BIOINDICATORS, HYDROCARBONS , PETROLEUM PRODUCTS, DETECTION, TOXICITY, BIOASSAY
0087 AMOCO CADIZ SPILL, CONTINGENCY PLANNING, GOVERNMENT AGENCIES, OIL SPILLS, TORREY CANYON SPILL, POLLUTION CONTROL, SPILL CLEANUP
0166 * FRANCE, NOAA, *CNEXO, COASTS, *ONGOING RESEARCH PROGRAMS
0231 * OIL SPILLS, TANKERS, OIL TRANSPORT, STATISTICS
0256 * TANKERS, SPILL CLEANUP, BEACH CLEANUP, CONTINGENCY PLANNING, EQUIPMENT, *LITIGATION
0335 * TANKERS, SPREADING, COASTS, FRANCE
0124 AMPHIPODS, BIOLOGICAL EFFECTS, TOXICITY, MORTALITY, CONCENTRATIONS, AROMATIC HYDROCARBONS, *NAPHTHALENE, *PARHYALE
0007 ANALYTICAL TECHNIQUES, DETECTION, GC/MS, PAH, AROMATIC HYDROCARBONS, INDUSTRIES, WASTEWATERS
0017 * MONITORING, WASTEWATERS, REFINERIES, WATER QUALITY, TOXICITY, FISH, BIOLOGICAL EFFECTS, BIOASSAY, *FREEZE CONCENTRATION TECHNIQUE
0020 * NATURAL SEEPAGE, OIL SPILLS, TAR, TANKERS, SANTA BARBARA CHANNEL, SOURCE IDENTIFICATION, CHROMATOGRAPHY, SPECTROSCOPY, MARINE ENVIRONMENT
0021 * SAMPLING, EQUIPMENT, OIL-WATER SEPARATION, *QUANTITATIVE FIELD METHOD
0023 * HYDROCARBONS , DETECTION, AQUATIC ENVIRONMENT
0025 * SAMPLING, HYDROCARBONS , CONTAMINATION, COASTAL WATERS, ITALY, *TYRRHENIAN SEA
0026 * CHEMICAL ANALYSIS, *FLUOROMETRY, PAH, *PARTITION COEFFICIENTS, *NAPHTHALENE HOMOLOGUES

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0027 ANALYTICAL TECHNIQUES, HYDROCARBONS , CONCENTRATIONS, SEAWATER, SPECTROSCOPY, BALTIC SEA, MEDITERRANEAN SEA, PACIFIC OCEAN, INDIAN OCEAN, *SEA OF JAPAN , *SEA OF OKHOTSK
0029 " SAMPLING, SPECTROSCOPY, OIL SPILLS, SOURCE IDENTIFICATION
0030 " ADSORPTION, DETECTION, HYDROCARBONS , SPECTROSCOPY, SOURCE IDENTIFICATION, *MOLECULAR SIEVE 5A
0034 " SOURCE IDENTIFICATION, WEATHERING, PHYSICAL EFFECTS, SPECTROSCOPY, *IR, *SIMULATION
0035 " SOURCE IDENTIFICATION, WEATHERING, OIL SPILLS, SPECTROSCOPY, *IR, *DATA BASE
0037 " SOURCE IDENTIFICATION, DETECTION, SEA SURFACE, SAMPLING, *SPECTROPHOTOMETRY
0103 " POLLUTION CONTROL, MONITORING, SOURCES, BOOK REVIEW
0138 " GROUNDWATER, CONTAMINATION, PETROCHEMICALS, POLLUTION PREVENTION, BIBLIOGRAPHIES
0125 ANIMALS, BIBLIOGRAPHIES, BIOLOGICAL EFFECTS, CONTAMINATION, TOXICITY, OIL SPILLS, BEHAVIOR, BIODEGRADATION, PLANTS, VERTEBRATES, INVERTEBRATES, MARINE ORGANISMS, CHEMICAL ANALYSIS, MICROORGANISMS
0145 ANTARCTICA, HYDROCARBONS , DISTRIBUTION, ENVIRONMENTAL EFFECTS, BIOGENIC HYDROCARBONS, FISH, BENTHOS, SEDIMENTS, *N-ALKANES
0044 API, *FIELD TESTS, EPA, OIL SPILLS, *CHEMICAL TREATMENT AGENTS
0046 " SPILL CLEANUP, DISPERSANTS, CALIFORNIA, EPA, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0071 " OIL SLICKS, SPILL CONTAINMENT, SPILL REMOVAL, DISPERSANTS, EQUIPMENT, SKIMMERS, ENVIRONMENTAL EFFECTS, PERSONNEL TRAINING, CONTINGENCY PLANNING, CALIFORNIA, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0208 " ECONOMICS, REFINERIES, ENVIRONMENTAL PROTECTION, COST ANALYSIS, POLLUTION PREVENTION, POLLUTION CONTROL, FATE, ENVIRONMENTAL EFFECTS
0023 AQUATIC ENVIRONMENT, ANALYTICAL TECHNIQUES, HYDROCARBONS , DETECTION
0109 " BIBLIOGRAPHIES, BIOLOGICAL EFFECTS, CONTAMINATION, FISH, FRESHWATER, *LITERATURE REVIEW
0129 " AROMATIC HYDROCARBONS, PAH, CHROMATOGRAPHY, FISH, BIODEGRADATION, BIOLOGICAL EFFECTS, CARCINOGENS, METABOLISM
R006 " CARCINOGENS, HYDROCARBONS , BIOINDICATORS, BIOLOGICAL EFFECTS, ESTUARIES, *BENZOPYRENE
0063 ARCTIC, SPILL CLEANUP, SUBARCTIC REGIONS, ECONOMICS, BIOLOGICAL EFFECTS, EVNIRONMENTAL EFFECTS
0119 " PHYTOPLANKTON, CRUDE OIL, SUBLETHAL EFFECTS, GROWTH, MORTALITY, BIOLOGICAL EFFECTS, *DIATOMS
0158 " OFFSHORE EXPLORATION, GREENLAND, OCS, *ENVIRONMENTAL CONDITIONS, BASELINE STUDIES, ICE
0162 " SPILL CLEANUP, POLLUTION CONTROL, INCINERATION, OIL DISCHARGES, BEHAVIOR, FATE, SUBARCTIC REGIONS, *EXPERIMENTAL SPILLS
0171 " MARINE ENVIRONMENT, MARINE ORGANISMS, FISH, BIRDS, CONTAMINATION, OIL SPILLS, OFFSHORE DEVELOPMENT, BIOLOGICAL EFFECTS, REPRODUCTION, OCS, *REVIEW
0190 " ALASKA , MODELS, FATE, BEHAVIOR, OIL SLICKS, ICE, PRUDHOE BAY, OFFSHORE DEVELOPMENT, NOAA, *OCSEAP
0209 " OIL TRANSPORT, OIL INDUSTRY, DEVELOPMENT , EXPLORATION , FOREIGN GOVERNMENTS, ECONOMICS, SOCIOECONOMIC EFFECTS, ENVIRONMENTAL EFFECTS, TANKERS, ICE, BEAUFORT SEA, CANADA
0328 " SHIPS, OIL SPILLS, ICE, CANADA, FUEL OIL, *UNDER-ICE SPILL, *ICE BREAKER
0329 " FUEL OIL, OIL SPILLS, CANADA, ICE, *AMUNDSEN GULF
R005 " DEVELOPMENT , PIPELINES, BIOLOGICAL EFFECTS, MAMMALS, FOOD WEB, HABITATS, ENVIRONMENTAL EFFECTS
0007 AROMATIC HYDROCARBONS, ANALYTICAL TECHNIQUES, DETECTION, GC/MS, PAH, INDUSTRIES, WASTEWATERS
0115 " UPTAKE, RELEASE, HYDROCARBONS , MOLLUSKS, BIOASSAY, BIOLOGICAL EFFECTS, *TAGGING, *MYTILUS EDULIS
0122 " FISH, HYDROCARBONS , SUBLETHAL EFFECTS, UPTAKE, RELEASE, METABOLISM, TOXICITY, BIOLOGICAL EFFECTS, *BENZENE, *TOLUENE, *TISSUES
0124 " AMPHIPODS, BIOLOGICAL EFFECTS, TOXICITY, MORTALITY, CONCENTRATIONS, *NAPHTHALENE, *PARHYALE
0128 " INVERTEBRATES, BIOLOGICAL EFFECTS, CHRONIC EFFECTS, *PETROL, *BENZENE, *1,2-DICHLOROETHANE, *MUTAGENESIS
0129 " AQUATIC ENVIRONMENT, PAH, CHROMATOGRAPHY, FISH, BIODEGRADATION, BIOLOGICAL EFFECTS, CARCINOGENS, METABOLISM
0134 " PAH, HYDROCARBONS , BIOLOGICAL EFFECTS, METABOLISM, FISH, *HEPATIC MICROSOMAL ENZYMES, *SALMO GAIRDNERI
0139 " CHEMICAL ANALYSIS, HYDROCARBONS , BIOGENIC HYDROCARBONS, SOURCES, *SEASONAL VARIATIONS, *BEDFORD BASIN, *NOVA SCOTIA
0178 " BIODEGRADATION, ENIRONMENTAL EFFECTS, MICROORGANISMS, *NAPHTHALENE
0180 " BIODEGRADATION, MICROORGANISMS, PAH, HYDROCARBONS , CONTAMINATION, SEDIMENTS, FRESHWATER, *TRANSFORMATION RATES
0183 " BIODEGRADATION, MICROORGANISMS, BACTERIA, BIOASSAY, METABOLISM, GROUNDWATER, WSF, FUEL OIL
0196 " ABSORPTION, HYDROCARBONS , FATE, EVAPORATION, BIODEGRADATION, WEATHERING, OCEANS, *PELAGIC WATERS
0198 " OCEANS, DISTRIBUTION, HYDROCARBONS , PAH, SOURCES, GC/MS

0156 ATLANTIC OCEAN, BLM, BASELINE STUDIES, OCS, HYDROCARBONS , SEDIMENTS, BENTHOS, ZOOPLANKTON, NEUSTON
0112 AUSTRALIA, UPTAKE, METABOLISM, FATE, CONTAMINATION, BIOLOGICAL EFFECTS, CHRONIC EFFECTS, ECONOMIC EFFECTS, HYDROCARBONS , BIOASSAY, FISH, FISHERIES, *MUGIL CEPHALUS
0165 " POLLUTION PREVENTION, ECONOMIC EFFECTS, OIL SPILLS, LEGISLATION, INTERNATIONAL CONVENTIONS
0060 BACTERIA, BIODEGRADATION, SPILL CLEANUP, OIL SLICKS, PRODUCT INFORMATION, WASTEWATERS, BALLAST , OIL DISCHARGES, OIL REMOVAL
0144 " FATE, OIL SPILLS, CHRONIC EFFECTS, BIODEGRADATION, SPILL CLEANUP, MICROORGANISM, SOURCES, *PETROPHILES
0177 " BIODEGRADATION, MICROORGANISMS, HYDROCARBONS , CRUDE OIL, *ALKANES, *LIPASE ACTIVITY, *ACINETOBACTER LWOFFI
0183 " AROMATIC HYDROCARBONS, BIODEGRADATION, MICROORGANISMS, BIOASSAY, METABOLISM, GROUNDWATER, WSF, FUEL OIL
0184 " BIODEGRADATION, MICROORGANISMS, CRUDE OIL, *CULTURE TECHNIQUES, *STANDARD, *HEXACHLOROETHANE
0277 " PETROCHEMICALS, INDUSTRIES, WASTEWATERS, BIODEGRADATION, TOXICITY, *METHANE FERMENTATION, *ANAEROBIC DIGESTION
0186 BAHAMAS, BIODEGRADATION, CRUDE OIL, SAMPLING, SEDIMENTS, FATE
0001 BALLAST , MONITORING, EQUIPMENT, DESIGN-ENGINEERING, TANKERS, OIL DISCHARGES
0002 " SURVEILLANCE, OIL DISCHARGES, DETECTION, COASTAL ZONE MANAGEMENT, FOREIGN GOVERNMENTS, FRANCE
0006 " MONITORING, EQUIPMENT, HYDROCARBONS , TANKERS, OIL DISCHARGES, LAW ENFORCEMENT, INTERNATIONAL AGREEMENTS, POLLUTION CONTROL
0060 " BACTERIA, BIODEGRADATION, SPILL CLEANUP, OIL SLICKS, PRODUCT INFORMATION, WASTEWATERS, OIL DISCHARGES, OIL REMOVAL
0110 " CONSERVATION, HABITATS, ENVIRONMENTAL DETERIORATION, BIOLOGICAL EFFECTS, ENVIRONMENTAL PROTECTION, UN, RESOURCE MANAGEMENT, MEDITERRANEAN SEA, *ENDANGERED SPECIES, *UNEP, *IUCN
0243 " STORAGE, POLLUTION PREVENTION, *UNDERWATER TANKS, DESIGN-ENGINEEERING
0244 " TANKERS, SHIPS, INTERNATIONAL CONVENTION, IMCO, OIL DISCHARGES, POLLUTION PREVENTION
0253 " OIL SPILLS, OIL DISCHARGES, SHIPS, LIABILITY, LAW ENFORCEMENT, SOURCE IDENTIFICATION, CHROMATOGRAPHY, CHEMICAL ANALYSIS, BERMUDA, *CASE STUDY, *LITIGATION
0268 " OIL-WATER SEPARATION, TANKERS, WASTEWATER TREATMENT, DISPOSAL , EQUIPMENT, MEDITERRANEAN SEA
0286 " OIL-WATER SEPARATION, PRODUCT INFORMATION, *BARGE
0027 BALTIC SEA, ANALYTICAL TECHNIQUES, HYDROCARBONS , CONCENTRATIONS, SEAWATER, SPECTROSCOPY, MEDITERRANEAN SEA, PACIFIC OCEAN, INDIAN OCEAN, *SEA OF JAPAN , *SEA OF OKHOTSK
0126 " WSF, HYDROCARBONS , FISH, TOXICITY, MORTALITY, BIOLOGICAL EFFECTS, *EGGS, *LARVAE, DEVELOPMENT , CRUDE OIL, FUEL OIL, CONTAMINATION
0003 BASELINE STUDIES, MONITORING, NOAA, MARINE ORGANISMS, MODELS, ENVIRONMENTAL EFFECTS, STORAGE, STRATEGIC PETROLEUM RESERVE, GULF OF MEXICO, *BRINE DISPOSAL
0091 " INTERNATIONAL AGREEMENTS, INTERNATIONAL CONVENTIONS, UN, MONITORING, CONTINGENCY PLANNING, LIABILITY, POLLUTION PREVENTION, POLLUTIONCONTROL, MEDITERRANEAN SEA, *MEDITERRANEAN ACTION PLAN, *UNEP
0142 " HYDROCARBONS , OFFSHORE PRODUCTION, PLATFORMS, OIL DISCHARGES, DETECTION, ENVIRONMENTAL EFFECTS, GULF OF MEXICO, *ALKANES
0151 " TEXAS, OCS, BLM, MARINE ORGANISMS, CHEMICAL ANALYSIS, HYDROCARBONS , SEDIMENTS
0152 " ALASKA , CONSERVATION, BIRDS, WILDLIFE, HABITATS, ENVIRONMENTAL EFFECTS, OFFSHORE DEVELOPMENT, RESOURCE MANAGEMENT, OIL SPILLS, *ANSER CANAGICUS
0153 " ENVIRONMENTAL EFFECTS, CONTAMINATION, ECONOMIC EFFECTS, COASTAL WATERS, ESTUARIES, WASHINGTON, *SENSITIVITY RATING
0154 " OCS, BLM, OFFSHORE DEVELOPMENT, ENVIRONMENTAL EFFECTS, *ENVIRONMENTAL STUDIES PROGRAM
0155 " OCS, BLM, ENVIRONMENTAL EFFECTS, PACIFIC OCEAN, CALIFORNIA
0156 " ATLANTIC OCEAN, BLM, OCS, HYDROCARBONS , SEDIMENTS, BENTHOS, ZOOPLANKTON, NEUSTON
0158 " ARCTIC, OFFSHORE EXPLORATION, GREENLAND, OCS, *ENVIRONMENTAL CONDITIONS, ICE
0159 " EIS, BLM, USGS, ENVIRONMENTAL EFFECTS, OCS, OIL-GAS LEASING, GULF OF MEXICO, *MAFLA AREA
0160 " OCS, BLM, *CULTURAL RESOURCES, OFFSHORE DEVELOPMENT, PACIFIC OCEAN, CALIFORNIA, *SOUTHERN CALIFORNIA BIGHT
0163 " ALASKA , OCS, NOAA, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, BEAUFORT SEA, *ECOSYSTEM PROCESS ANALYSIS
0175 " TANKERS, SANSINENA SPILL, BIOLOGICAL EFFECTS, PHYSICAL EFFECTS, HARBORS, CALIFORNIA, FUEL OIL, MARINE ENVIRONMENT
0185 " ALASKA , BIODEGRADATION, MICROORGANISMS, HYDROCARBONS , DISTRIBUTION, *BIODEGRADATION POTENTIAL, OCS, GULF OF ALASKA, BEAUFORT SEA
0229 " ECOSYSTEMS, PIPELINES, OIL SPILLS, DEVELOPMENT , ENVIRONMENTAL EFFECTS, *CONFERENCE
R008 " ENVIRONMENTAL EFFECTS, HYDROCARBONS , OIL SPILLS, MODELS, SPILL TRAJECTORIES, PUGET SOUND, STRAIT OF MAGELLAN
0314 BAYS, OIL SPILLS, FUEL OIL, PUERTO RICO

0081 BEACH CLEANUP, SPILL REMOVAL, PATENT, *CRYOGENIC BEACH CLEANER
0256 " AMOCO CADIZ SPILL, TANKERS, SPILL CLEANUP, CONTINGENCY PLANNING, EQUIPMENT, *LITIGATION
0038 BEACHES, CONTINGENCY PLANNING, COASTS, SHORELINES, MARSHES, CORAL REEFS, OIL SPILLS, ENVIRONMENTAL EFFECTS, COASTAL ZONE MANAGEMENT, SPILL CLEANUP, *COASTAL VULNERABILITY INDEX
0140 " OIL SPILLS, DISTRIBUTION, SEDIMENTATION, FATE, SHORELINES, ENVIRONMENTAL EFFECTS, ONSHORE IMPACTS, URQUIOLA SPILL
0147 " ALASKA , CRUDE OIL, INTERTIDAL ZONE, MARINE ORGANISMS, SEDIMENTS, BIOLOGICAL EFFECTS, FATE, PHYSICAL EFFECTS, *TIDAL FLATS
0300 " OIL SPILLS, TANKERS, CRUDE OIL, MOVEMENT, COASTS, SPAIN, *ANDROS PATRIA SPILL
0309 " SPILL CONTAINMENT, SPILL CLEANUP, BOOMS, TANKERS, OIL TERMINALS, RELEASE, ENVIRONMENTAL EFFECTS, BIRDS, MORTALITY, SCOTLAND
0334 " OIL SPILLS, OIL TANKERS, PUERTO RICO, CONTAMINATION, REFINERIES
0337 " OIL SPILLS, SHIPS, FUEL OIL, HARBORS, SCOTLAND
0163 BEAUFORT SEA, BASELINE STUDIES, ALASKA , OCS, NOAA, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, *ECOSYSTEM PROCESS ANALYSIS
0185 " BASELINE STUDIES, ALASKA , BIODEGRADATION, MICROORGANISMS, HYDROCARBONS , DISTRIBUTION, *BIODEGRADATION POTENTIAL, OCS, GULF OF ALASKA
0205 " ARCTIC, OIL TRANSPORT, OIL INDUSTRY, DEVELOPMENT , EXPLORATION , FOREIGN GOVERNMENTS, ECONOMICS, SOCIOECONOMIC EFFECTS, ENVIRONMENTAL EFFECTS, TANKERS, ICE, CANADA
0033 BEHAVIOR, BIODEGRADATION, CHEMICAL ANALYSIS, HYDROCARBONS , CHROMATOGRAPHY, CRUDE OIL, *C14 LABELLED ESTER
0125 " ANIMALS, BIBLIOGRAPHIES, BIOLOGICAL EFFECTS, CONTAMINATION, TOXICITY, OIL SPILLS, BIODEGRADATION, PLANTS, VERTEBRATES, INVERTEBRATES, MARINE ORGANISMS, CHEMICAL ANALYSIS, MICROORGANISMS
0162 " ARCTIC, SPILL CLEANUP, POLLUTION CONTROL, INCINERATION, OIL DISCHARGES, FATE, SUBARCTIC REGIONS, *EXPERIMENTAL SPILLS
0190 " ARCTIC, ALASKA , MODELS, FATE, OIL SLICKS, ICE, PRUDHOE BAY, OFFSHORE DEVELOPMENT, NOAA, *OCSEAP
0193 " DRIFT, MOVEMENT, OIL SLICKS, MODELS, PREDICTION, FATE, STRAIT OF MAGELLAN
0008 BENTHOS, MONITORING, HYDROCARBONS , CHEMICAL ANALYSIS, CRUSTACEANS, FOOD WEB, ENVIRONMENTAL EFFECTS, OFFSHORE DRILLING, OCS, TEXAS, GULF OF MEXICO
0137 " HYDROCARBONS , SEDIMENTS, DISTRIBUTION, CHEMICAL ANALYSIS, CHROMATOGRAPHY, RHODE ISLAND, *RHODE ISLAND SOUND, *ARCTICA ISLANDICA
0145 " ANTARCTICA, HYDROCARBONS , DISTRIBUTION, ENVIRONMENTAL EFFECTS, BIOGENIC HYDROCARBONS, FISH, SEDIMENTS, *N-ALKANES
0156 " BASELINE STUDIES, ATLANTIC OCEAN, BLM, OCS, HYDROCARBONS , SEDIMENTS, ZOOPLANKTON, NEUSTON
0253 BERMUDA, BALLAST , OIL SPILLS, OIL DISCHARGES, SHIPS, LIABILITY, LAW ENFORCEMENT, SOURCE IDENTIFICATION, CHROMATOGRAPHY, CHEMICAL ANALYSIS, *CASE STUDY, *LITIGATION
0316 " TANKERS, OIL TRANSFER, FUEL OIL, OIL SPILLS, CORAL REEFS, *MARI BOEING SPILL
0317 " OIL SPILLS, FUEL OIL, SHIPS, MOVEMENT, COASTS, SPILL CLEANUP, *MARI BOEING SPILL ,
0109 BIBLIOGRAPHIES, AQUATIC ENVIRONMENT, BIOLOGICAL EFFECTS, CONTAMINATION, FISH, FRESHWATER, *LITERATURE REVIEW
0125 " BEHAVIOR, ANIMALS, BIOLOGICAL EFFECTS, CONTAMINATION, TOXICITY, OIL SPILLS, BIODEGRADATION, PLANTS, VERTEBRATES, INVERTEBRATES, MARINE ORGANISMS, CHEMICAL ANALYSIS, MICROORGANISMS
0138 " ANALYTICAL TECHNIQUES, GROUNDWATER, CONTAMINATION, PETROCHEMICALS, POLLUTION PREVENTION
0174 " ESTUARIES, OCEANS, BIOLOGICAL EFFECTS, FATE, MARINE ORGANISMS, *LITERATURE REVIEW
0222 " UK, NORTH SEA, OFFSHORE DEVELOPMENT, ONSHORE IMPACTS, ENVIRONMENTAL EFFECTS, *SCOTLAND LIBRARIES
0227 " OIL SHALE, EXPLORATION , DEVELOPMENT , ENVIRONMENTAL EFFECTS
0258 " REFINING, POLLUTION CONTROL, WASTEWATER TREATMENT, SLUDGE , COST ANALYSIS, CHEMICAL ANALYSIS, SAMPLING
0017 BIOASSAY, ANALYTICAL TECHNIQUES, MONITORING, WASTEWATERS, REFINERIES, WATER QUALITY, TOXICITY, FISH, BIOLOGICAL EFFECTS, *FREEZE CONCENTRATION TECHNIQUE
0028 " ALGAE, TOXICITY, MORTALITY, PHYTOPLANKTON, DISPERSANTS, *POPULATION GROWTH RATES, *CHLAMYDOMONAS, *COREXIT 9527
0031 " TOXICITY, *TESTING TECHNIQUES, BIOLOGICAL EFFECTS
0112 " AUSTRALIA, UPTAKE, METABOLISM, FATE, CONTAMINATION, BIOLOGICAL EFFECTS, CHRONIC EFFECTS, ECONOMIC EFFECTS, HYDROCARBONS , FISH, FISHERIES, *MUGIL CEPHALUS
0113 " TOXICITY, SUBLETHAL EFFECTS, MORTALITY, FUEL OIL, WSF, CONCENTRATIONS, GULF OF MEXICO, CRUSTACEANS, *LUCIA EXOTICA
0115 " AROMATIC HYDROCARBONS, UPTAKE, RELEASE, HYDROCARBONS , MOLLUSKS, BIOLOGICAL EFFECTS, *TAGGING, *MYTILUS EDULIS
0131 " ACUTE EFFECTS, TOXICITY, HYDROCARBONS , PETROLEUM PRODUCTS, SOLVENTS, BIOLOGICAL EFFECTS, METABOLISM, *ALKALINE PHOSPHATASE, *LIPID PEROXIDATION
0133 " BIOLOGICAL EFFECTS, DEVELOPMENT , HYDROCARBONS , WSF, FUEL OIL, INVERTEBRATES, POLYCHAETES, *RESISTANCE, *INHERITANCE OF RESISTANCE, *NEANTHES ARENACEODENTATA
0183 " BACTERIA, AROMATIC HYDROCARBONS, BIODEGRADATION, MICROORGANISMS, METABOLISM, GROUNDWATER, WSF, FUEL OIL

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0221 BIOASSAY, ALASKA , DRILLING , BIOLOGICAL EFFECTS, PHYSICAL EFFECTS, SAMPLING, DISTRIBUTION, MARINE ORGANISMS
R001 " ALGAE, BIOINDICATORS, HYDROCARBONS , PETROLEUM PRODUCTS, DETECTION, TOXICITY
0019 BIODEGRADATION, FOOD WEB, HYDROCARBONS , GC, FISH, *BIOLOGICAL HALF LIFE, *N-ALKANES, *BIOMAGNIFICATION, *MUGIL CEPHALUS
0033 " BEHAVIOR, CHEMICAL ANALYSIS, HYDROCARBONS , CHROMATOGRAPHY, CRUDE OIL, *C14 LABELLED ESTER
0049 " SURFACTANTS, SEAWATER, OIL SLICKS, EMULSIFICATION, OIL REMOVAL, *SALINITY
0060 " BALLAST , BACTERIA, SPILL CLEANUP, OIL SLICKS, PRODUCT INFORMATION, WASTEWATERS, OIL DISCHARGES, OIL REMOVAL
0073 " OIL SPILLS, GROUNDWATER, MICROORGANISMS, SOIL, HYDROCARBONS , *BIORECLAMATION
0125 " BIBLIOGRAPHIES, BEHAVIOR, ANIMALS, BIOLOGICAL EFFECTS, CONTAMINATION, TOXICITY, OIL SPILLS, PLANTS, VERTEBRATES, INVERTEBRATES, MARINE ORGANISMS, CHEMICAL ANALYSIS, MICROORGANISMS
0129 " AROMATIC HYDROCARBONS, AQUATIC ENVIRONMENT, PAH, CHROMATOGRAPHY, FISH, BIOLOGICAL EFFECTS, CARCINOGENS, METABOLISM
0144 " BACTERIA, FATE, OIL SPILLS, CHRONIC EFFECTS, SPILL CLEANUP, MICROORGANISM, SOURCES, *PETROPHILES
0176 " POLLUTION CONTROL, MICROORGANISMS, OIL SPILLS, BOOK REVIEW
0177 " BACTERIA, MICROORGANISMS, HYDROCARBONS , CRUDE OIL, *ALKANES, *LIPASE ACTIVITY, *ACINETOBACTER LWOFFI
0178 " AROMATIC HYDROCARBONS, ENIRONMENTAL EFFECTS, MICROORGANISMS, *NAPHTHALENE
0179 " LAND FARMING, SLUDGE , WASTE DISPOSAL, STORAGE, REFINERIES
0180 " AROMATIC HYDROCARBONS, MICROORGANISMS, PAH, HYDROCARBONS , CONTAMINATION, SEDIMENTS, FRESHWATER, *TRANSFORMATION RATES
0181 " POLLUTION CONTROL, BIOLOGICAL EFFECTS, MICROORGANISMS, BOOK REVIEW
0182 " MICROORGANISMS, HYDROCARBONS , FATE, SOIL, GROUNDWATER, CHEMICAL ANALYSIS, WSF, FUEL OIL
0183 " BIOASSAY, BACTERIA, AROMATIC HYDROCARBONS, MICROORGANISMS, METABOLISM, GROUNDWATER, WSF, FUEL OIL
0184 " BACTERIA, MICROORGANISMS, CRUDE OIL, *CULTURE TECHNIQUES, *STANDARD, *HEXACHLOROETHANE
0185 " BEAUFORT SEA, BASELINE STUDIES, ALASKA , MICROORGANISMS, HYDROCARBONS , DISTRIBUTION, *BIODEGRADATION POTENTIAL, OCS, GULF OF ALASKA
0186 " BAHAMAS, CRUDE OIL, SAMPLING, SEDIMENTS, FATE
0187 " ALGAE, MICROORGANISMS, HYDROCARBONS , *PROTOTHECA, *HYDROCARBON UTILIZATION
0196 " AROMATIC HYDROCARBONS, ABSORPTION, HYDROCARBONS , FATE, EVAPORATION, WEATHERING, OCEANS, *PELAGIC WATERS
0197 " FATE, NATURAL SEEPAGE, OFFSHORE PRODUCTION, OIL TRANSPORT, PETROLEUM PRODUCTS, OIL DISCHARGES
0269 " LAND FARMING, *WASTE TREATMENT, MICROORGANISMS
0277 " BACTERIA, PETROCHEMICALS, INDUSTRIES, WASTEWATERS, TOXICITY, *METHANE FERMENTATION, *ANAEROBIC DIGESTION
0132 BIOGENIC HYDROCARBONS, HYDROCARBONS , CRUSTACEANS, CHEMICAL ANALYSIS, MARINE ORGANISMS, NATURAL SEEPAGE, *EMERITA ANALOGA
0136 " HYDROCARBONS , CHEMICAL ANALYSIS, GLC, MOLLUSKS, MARINE ORGNAISMS, UPTAKE, METABOLISM, *N-ALKANES, *CRASSOSTREA GIGAS, *TAPES JAPONICA
0139 " AROMATIC HYDROCARBONS, CHEMICAL ANALYSIS, HYDROCARBONS , SOURCES, *SEASONAL VARIATIONS, *BEDFORD BASIN, *NOVA SCOTIA
0145 " BENTHOS, ANTARCTICA, HYDROCARBONS , DISTRIBUTION, ENVIRONMENTAL EFFECTS, FISH, SEDIMENTS, *N-ALKANES
0005 BIOINDICATORS, MONITORING, HYDROCARBONS , CHEMICAL ANALYSIS, SAMPLING, MOLLUSKS, *OYSTERS, COASTAL WATERS, *MUSSEL WATCH PROGRAM
R001 " BIOASSAY, ALGAE, HYDROCARBONS , PETROLEUM PRODUCTS, DETECTION, TOXICITY
R006 " AQUATIC ENVIRONMENT, CARCINOGENS, HYDROCARBONS , BIOLOGICAL EFFECTS, ESTUARIES, *BENZOPYRENE
0017 BIOLOGICAL EFFECTS, BIOASSAY, ANALYTICAL TECHNIQUES, MONITORING, WASTEWATERS, REFINERIES, WATER QUALITY, TOXICITY, FISH, *FREEZE CONCENTRATION TECHNIQUE
0031 " BIOASSAY, TOXICITY, *TESTING TECHNIQUES
0063 " ARCTIC, SPILL CLEANUP, SUBARCTIC REGIONS, ECONOMICS, EVNIRONMENTAL EFFECTS
0104 " TOXICITY, CONTAMINATION, FRESHWATER, INVERERTEBRATES, MOLLUSKS, CRUSTACEANS, HYDROCARBONS , DISPERSANTS
0105 " UPTAKE, METABOLISM, HYDROCARBONS , CRUSTACEANS, WEST INDIES
0107 " ALGAE, WSF, CRUDE OIL, FUEL OIL, TOXICITY, *MICROALGAE, *PH, *PHOTOSYNTHESIS, *O2 EVOLUTION, SUBLETHAL EFFECTS
0108 " ALGAE, ACUTE EFFECTS, WSF, TOXICITY, ENVIRONMENTAL EFFECTS, CHRONIC EFFECTS, FUEL OIL, CRUDE OIL, CRANKCASE OIL, BIOMASS
0109 " BIBLIOGRAPHIES, AQUATIC ENVIRONMENT, CONTAMINATION, FISH, FRESHWATER, *LITERATURE REVIEW
0110 " BALLAST , CONSERVATION, HABITATS, ENVIRONMENTAL DETERIORATION, ENVIRONMENTAL PROTECTION, UN, RESOURCE MANAGEMENT, MEDITERRANEAN SEA, *ENDANGERED SPECIES, *UNEP, *IUCN
0111 " WSF, HYDROCARBONS , CRUDE OIL, EKOFISK BLOWOUT, PLANKTON, CRUSTACEANS, FOOD WEB, *ZOEAL LARVAE, *HYAS ARANEUS

0112 BIOLOGICAL EFFECTS, BIOASSAY, AUSTRALIA, UPTAKE, METABOLISM, FATE, CONTAMINATION,
CHRONIC EFFECTS, ECONOMIC EFFECTS, HYDROCARBONS , FISH, FISHERIES, *MUGIL CEPHALUS
0114 " BIRDS, CRUDE OIL, DETECTION, *FLUOROMETRY, *ANAS PLATYRHYNCHOS, *EGGS
0115 " BIOASSAY, AROMATIC HYDROCARBONS, UPTAKE, RELEASE, HYDROCARBONS , MOLLUSKS,
*TAGGING, *MYTILUS EDULIS
0116 " ALGAE, DISPERSANTS, TOXICITY, *CHLAMYDOMONAS REINHARDTI, *DUNALIELLA MARINA
0117 " BIRDS, CRUDE OIL, REPRODUCTION, *ANAS PLATYRHYNCHOS, *INGESTION
0118 " BIRDS, CONTAMINATION, MORTALITY, TOXICITY, CHRONIC EFFECTS, CRUDE OIL, FUEL OIL,
*INGESTION, *ANAS PLATYRHYNCHOS
0119 " ARCTIC, PHYTOPLANKTON, CRUDE OIL, SUBLETHAL EFFECTS, GROWTH, MORTALITY, *DIATOMS
0121 " MOLLUSKS, *CAROTENOIDS, MARINE ORGANISMS, METABOLISM
0122 " AROMATIC HYDROCARBONS, FISH, HYDROCARBONS , SUBLETHAL EFFECTS, UPTAKE, RELEASE,
METABOLISM, TOXICITY, *BENZENE, *TOLUENE, *TISSUES
0123 " ALGAE, PETROLEUM PRODUCTS, TOXICITY, GROWTH, *PHOTOSYNTHESIS, *BLUE-GREEN ALCAE
0124 " AROMATIC HYDROCARBONS, AMPHIPODS, TOXICITY, MORTALITY, CONCENTRATIONS,
*NAPHTHALENE, *PARHYALE
0125 " BIODEGRADATION, BIBLIOGRAPHIES, BEHAVIOR, ANIMALS, CONTAMINATION, TOXICITY, OIL
SPILLS, PLANTS, VERTEBRATES, INVERTEBRATES, MARINE ORGANISMS, CHEMICAL ANALYSIS,
MICROORGANISMS
0126 " BALTIC SEA, WSF, HYDROCARBONS , FISH, TOXICITY, MORTALITY, *EGGS, *LARVAE,
DEVELOPMENT , CRUDE OIL, FUEL OIL, CONTAMINATION
0127 " CRUDE OIL, FUEL OIL, METABOLISM, BIRDS, *SALT GLAND, *NACL SECRETION, *LAPUS
GLAUCESCENS
0128 " AROMATIC HYDROCARBONS, INVERTEBRATES, CHRONIC EFFECTS, *PETROL, *BENZENE,
*1,2-DICHLOROETHANE, *MUTAGENESIS
0129 " BIODEGRADATION, AROMATIC HYDROCARBONS, ACUATIC ENVIRONMENT, PAH, CHROMATOGRAPHY,
FISH, CARCINOGENS, METABOLISM
0130 " TOXICITY, FISH
0131 " BIOASSAY, ACUTE EFFECTS, TOXICITY, HYDROCARBONS , PETROLEUM PRODUCTS, SOLVENTS,
METABOLISM, *ALKALINE PHOSPHATASE, *LIPID PEROXIDATION
0133 " BIOASSAY, DEVELOPMENT , HYDROCARBONS , WSF, FUEL OIL, INVERTEBRATES, POLYCHAETES,
*RESISTANCE, *INHERITANCE OF RESISTANCE, *NEANTHES ARENACEODENTATA
0134 " AROMATIC HYDROCARBONS, PAH, HYDROCARBONS , METABOLISM, FISH, *HEPATIC MICROSOMAL
ENZYMES, *SALMO GAIRDNERI
0135 " DISPERSANTS, TOXICITY, MARINE ORGANISMS, FISH, MOLLUSKS, *CLAMS
0143 " OIL SPILLS, SOCIOECONOMIC EFFECTS, FISHERIES, *COLUMBIA, *ECUADOR, *ST. PETER SPILL
0147 " BEACHES, ALASKA , CRUDE OIL, INTERTIDAL ZONE, MARINE ORGANISMS, SEDIMENTS, FATE,
PHYSICAL EFFECTS, *TIDAL FLATS
0148 " OIL SPILLS, FUEL OIL, RECOVERY, CALIFORNIA, SANSINENA SPILL
0171 " ARCTIC, MARINE ENVIRONMENT, MARINE ORGANISMS, FISH, BIRDS, CONTAMINATION, OIL
SPILLS, OFFSHORE DEVELOPMENT, REPRODUCTION, OCS, *REVIEW
0174 " BIBLIOGRAPHIES, ESTUARIES, OCEANS, FATE, MARINE ORGANISMS, *LITERATURE REVIEW
0175 " BASELINE STUDIES, TANKERS, SANSINENA SPILL, PHYSICAL EFFECTS, HARBORS, CALIFORNIA,
FUEL OIL, MARINE ENVIRONMENT
0181 " BIODEGRADATION, POLLUTION CONTROL, MICROORGANISMS, BOOK REVIEW
0200 " FISH, FISHERIES, OCS, OFFSHORE DEVELOPMENT, SANTA BARBARA CHANNEL
0221 " BIOASSAY, ALASKA , DRILLING , PHYSICAL EFFECTS, SAMPLING, DISTRIBUTION, MARINE
ORGANISMS
0271 " WASTEWATERS, PETROCHEMICALS, TOXICITY, AQUATIC ENVIRONMENTS, *ACUATIC ORGANISMS
0282 " REFINERIES, CHEMICAL EFFECTS, TOXICITY, WASTE OIL, WASTEWATERS, POLAND
R005 " ARCTIC, DEVELOPMENT , PIPELINES, MAMMALS, FOOD WEB, HABITATS, ENVIRONMENTAL EFFECTS
R006 " BIOINDICATORS, ACUATIC ENVIRONMENT, CARCINOGENS, HYDROCARBONS , ESTUARIES,
*BENZOPYRENE
0108 BIOMASS, BIOLOGICAL EFFECTS, ALGAE, ACUTE EFFECTS, WSF, TOXICITY, ENVIRONMENTAL
EFFECTS, CHRONIC EFFECTS, FUEL OIL, CRUDE OIL, CRANKCASE OIL
0199 " PLATFORMS, SAMPLING, DISTRIBUTIONS, WASTEWATERS, OIL FIELDS, GULF OF MEXICO,
*BIOFOULING
0106 BIRDS, MORTALITY, SPILL CLEANUP, DISPERSANTS, BOOMS, TANKERS, *SHETLAND ISLANDS, *ESSO
BERNICA SPILL
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0208 " API, ECONOMICS, REFINERIES, ENVIRONMENTAL PROTECTION, POLLUTION PREVENTION, POLLUTION CONTROL, FATE, ENVIRONMENTAL EFFECTS
0226 " BOOK REVIEW, REFINERIES, WASTEWATERS, SOCIOECONOMIC EFFECTS, POLLUTION PREVENTION, POLLUTION CONTROL
0258 " CHEMICAL ANALYSIS, BIBLIOGRAPHIES, REFINING, POLLUTION CONTROL, WASTEWATER TREATMENT, SLUDGE , SAMPLING
0265 " WASTE OIL, DISPOSAL , SOURCES, MARINE ENVIRONMENT, *ENGINEERING, REGULATIONS, OIL DISCHARGES, TANKERS, REFINING, NATURAL SEEPAGE, SLUDGE
0299 " RECLAMATION, WASTE OIL, CRANKCASE OIL, LUBRICATING OIL, ECONOMICS, REFINING, RECYCLING
0062 CRANKCASE OIL, ABSORPTION, SORBENTS, SPILL CLEANUP, CRUDE OIL, *REFINED OIL, *RECLAIMED RUBBER PARTICLES
0108 " CHRONIC EFFECTS, BIOMASS, BIOLOGICAL EFFECTS, ALGAE, ACUTE EFFECTS, WSF, TOXICITY, ENVIRONMENTAL EFFECTS, FUEL OIL, CRUDE OIL
0299 " COST ANALYSIS, RECLAMATION, WASTE OIL, LUBRICATING OIL, ECONOMICS, REFINING, RECYCLING
0033 CRUDE OIL, CHROMATOGRAPHY, CHEMICAL ANALYSIS, BIODEGRADATION, BEHAVIOR, HYDROCARBONS , *C14 LABELLED ESTER
0038 " SOURCE IDENTIFICATION, TAR, NATURAL SEEPAGE, SEDIMENTS, *ISOTOPE RATIOS
0062 " CRANKCASE OIL, ABSORPTION, SORBENTS, SPILL CLEANUP, *REFINED OIL, *RECLAIMED RUBBER PARTICLES
0084 " CONTINGENCY PLANNING, OIL TERMINALS, UK, SPILL CLEANUP, ESTUARIES, *AMLWCH SPILL
0107 " BIOLOGICAL EFFECTS, ALGAE, WSF, FUEL OIL, TOXICITY, *MICROALGAE, *PH, *PHOTOSYNTHESIS, *O2 EVOLUTION, SUBLETHAL EFFECTS
0108 " CRANKCASE OIL, CHRONIC EFFECTS, BIOMASS, BIOLOGICAL EFFECTS, ALGAE, ACUTE EFFECTS, WSF, TOXICITY, ENVIRONMENTAL EFFECTS, FUEL OIL

0111 CRUDE OIL, BIOLOGICAL EFFECTS, WSF, HYDROCARBONS , EKOFISK BLOWOUT, PLANKTON, CRUSTACEANS, FOOD WEB, *ZOEAL LARVAE, *HYAS ARANEUS
0114 " BIRDS, BIOLOGICAL EFFECTS, DETECTION, *FLUOROMETRY, *ANAS PLATYRHYNCHOS, *EGGS
0117 " BIRDS, BIOLOGICAL EFFECTS, REPRODUCTION, *ANAS PLATYRHYNCHOS, *INGESTION
0118 " CONTAMINATION, CHRONIC EFFECTS, BIRDS, BIOLOGICAL EFFECTS, MORTALITY, TOXICITY, FUEL OIL, *INGESTION, *ANAS PLATYRHYNCHOS
0119 " BIOLOGICAL EFFECTS, ARCTIC, PHYTOPLANKTON, SUBLETHAL EFFECTS, GROWTH, MORTALITY, *DIATOMS
0126 " CONTAMINATION, BIOLOGICAL EFFECTS, BALTIC SEA, WSF, HYDROCARBONS , FISH, TOXICITY, MORTALITY, *EGGS, *LARVAE, DEVELOPMENT , FUEL OIL
0127 " BIRDS, BIOLOGICAL EFFECTS, FUEL OIL, METABOLISM, *SALT GLAND, *NACL SECRETION, *LARUS GLAUCESCENS
0147 " BIOLOGICAL EFFECTS, BEACHES, ALASKA , INTERTIDAL ZONE, MARINE ORGANISMS, SEDIMENTS, FATE, PHYSICAL EFFECTS, *TIDAL FLATS
0177 " BIODEGRADATION, BACTERIA, MICROORGANISMS, HYDROCARBONS , *ALKANES, *LIPASE ACTIVITY, *ACINETOBACTER LWOFFI
0184 " BIODEGRADATION, BACTERIA, MICROORGANISMS, *CULTURE TECHNIQUES, *STANDARD, *HEXACHLOROETHANE
0186 " BIODEGRADATION, BAHAMAS, SAMPLING, SEDIMENTS, FATE
0237 " SPILL CLEANUP, SPILL CONTAINMENT, SPILL REMOVAL, LAND FARMING, PIPELINES, ILLINOIS
0257 " TRANS-ALASKA PIPELINE, OIL TRANSFER, OIL TERMINALS, OIL INDUSTRY, TANKERS, PIPELINES, LEGISLATION, ENVIRONMENTAL EFFECTS
0300 " COASTS, BEACHES, OIL SPILLS, TANKERS, MOVEMENT, SPAIN, *ANDROS PATRIA SPILL
0311 " SPILL CLEANUP, PIPELINES, *CLEANUP COSTS, *UTAH, *FARMINGTON BAY SPILL
0313 " OIL SPILLS, TANKERS, OIL TERMINALS, PORTS , SPILL CLEANUP, SHORELINES, IRELAND, *BETELGEUSE SPILL
0321 " OIL SPILLS, TANKERS, DISPERSANTS, OIL SLICKS, SPREADING, SPILL CLEANUP, SPAIN, *ANDROS PATRIA SPILL
0322 " TANKERS, OIL TRANSFER, OIL SPILLS, SHORELINES, SPILL CLEANUP, EQUIPMENT, SPAIN, *ANDROS PATRIA SPILL
0325 " OIL SPILLS, SPILL CLEANUP, TANKERS, TEXAS, *ESSO BAYWAY SPILL
0245 CRUDE OIL WASHING, TANKERS, SHIPS, SAFETY, IMCO, INTERNATIONAL CONVENTIONS, POLLUTION PREVENTION, SEGREGATED BALLAST, OIL TRANSPORT
0247 " US, IMCO, REGULATION, TANKERS, SEGREGATED BALLAST, INTERNATIONAL AGREEMENTS
0252 " INTERNATIONAL AGREEMENTS, INTERNATIONAL CONVENTIONS, IMCO, TANKERS, SAFETY, POLLUTION CONTROL, SEGREGATED BALLAST
0008 CRUSTACEANS, CHEMICAL ANALYSIS, BENTHOS, MONITORING, HYDROCARBONS , FOOD WEB, ENVIRONMENTAL EFFECTS, OFFSHORE DRILLING, OCS, TEXAS, GULF OF MEXICO
0104 " CONTAMINATION, BIOLOGICAL EFFECTS, TOXICITY, FRESHWATER, INVERERTEBRATES, MOLLUSKS, HYDROCARBONS , DISPERSANTS
0105 " BIOLOGICAL EFFECTS, UPTAKE, METABOLISM, HYDROCARBONS , WEST INDIES
0111 " CRUDE OIL, BIOLOGICAL EFFECTS, WSF, HYDROCARBONS , EKOFISK BLOWOUT, PLANKTON, FOOD WEB, *ZOEAL LARVAE, *HYAS ARANEUS
0113 " CONCENTRATIONS, BIOASSAY, TOXICITY, SUBLETHAL EFFECTS, MORTALITY, FUEL OIL, WSF, GULF OF MEXICO, *LUGIA EXOTICA
0132 " CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, HYDROCARBONS , MARINE ORGANISMS, NATURAL SEEPAGE, *EMERITA ANALOGA
0146 DECOMPOSITION, CONTINGENCY PLANNING, ALASKA , OIL SPILLS, FATE, DISPERSION, PREDICTION, SHORELINES, ENVIRONMENTAL EFFECTS, OFFSHORE DEVELOPMENT, *COOK INLET
0024 DEEPWATER PORTS, CHEMICAL ANALYSIS, SAMPLING, DISTRIBUTION, *FLOUROMETRY, DETECTION, MONITORING, LOUISIANA, EQUIPMENT, USCG
0241 " OFFSHORE TERMINALS, OIL TRANSFER, TANKERS, GULF OF MEXICO, TEXAS, POLLUTION PREVENTION
0242 " INTERNATIONAL AGREEMENTS, OIL TRANSPORT, OIL TRANSFER, PIPELINES, TANKERS, US, NORWAY, *LOOP
0336 DENMARK, BIRDS, OIL SPILLS, TANKERS, FUEL OIL, SHORELINES, ICE, MORTALITY, *THUNTANK 3 SPILL
0001 DESIGN-ENGINEERING, BALLAST , MONITORING, EQUIPMENT, TANKERS, OIL DISCHARGES
0042 " BOOMS, SPILL CONTAINMENT, EQUIPMENT, PATENT
0043 " BOOMS, SPILL CONTAINMENT, PATENT, *CONNECTOR ASSEMBLY
0048 " SPILL CLEANUP, EQUIPMENT, SURFACTANTS, PATENT
0064 " SPILL CLEANUP, SKIMMERS, EQUIPMENT, PRODUCT INFORMATION
0072 " CANADA, SPILL CLEANUP, SPILL REMOVAL, SKIMMERS, EQUIPMENT, *PUMPS
0085 " CONTINGENCY PLANNING, SKIMMERS, EQUIPMENT, USN, *SKIMMER MODIFICATIONS
0240 " PIPELINES, EQUIPMENT, MONITORING, LEAKAGE, DETECTION, PRODUCT INFORMATION
0290 " OIL-WATER SEPARATION, WASTEWATER TREATMENT, POLLUTION CONTROL, PATENT, *FLUIDIZED BEDS
0293 " OIL-WATER SEPARATION, WASTEWATER TREATMENT, USN, EQUIPMENT
0294 " OIL-WATER SEPARATION, WASTEWATER TREATMENT, EQUIPMENT, PATENT
0339 " BOOMS, EQUIPMENT, SPILL CLEANUP, SORBENTS, MONITORING, NORWAY
0002 DETECTION, COASTAL ZONE MANAGEMENT, BALLAST , SURVEILLANCE, OIL DISCHARGES, FOREIGN GOVERNMENTS, FRANCE
0007 " AROMATIC HYDROCARBONS, ANALYTICAL TECHNIQUES, GC/MS, PAH, INDUSTRIES, WASTEWATERS
0011 " REMOTE SENSING, OIL SLICKS, SANTA BARBARA CHANNEL, *LANDSAT DATA, MONITORING, OFFSHORE EXPLORATION

0012 DETECTION, REMOTE SENSING, MONITORING, SEA SURFACE, NOAA, MOVEMENT, SPILL TRAJECTORIES
0013 " REMOTE SENSING, NATURAL SEEPAGE, MARINE ENVIRONMENT, OCS, GULF OF MEXICO, TEXAS, LOUISIANA
0014 " REMOTE SENSING, OIL SLICKS, SEA SURFACE, *C02 LASER
0023 " AQUATIC ENVIRONMENT, ANALYTICAL TECHNIQUES, HYDROCARBONS
0024 " DEEPWATER PORTS, CHEMICAL ANALYSIS, SAMPLING, DISTRIBUTION, *FLOUROMETRY, MONITORING, LOUISIANA, EQUIPMENT, USCG
0030 " ANALYTICAL TECHNIQUES, ADSORPTION, HYDROCARBONS , SPECTROSCOPY, SOURCE IDENTIFICATION, *MOLECULAR SIEVE 5A
0036 " CONTAMINATION, SOURCE IDENTIFICATION, LEAKAGE, STORAGE, FUEL OIL, PETROLEUM PRODUCTS, *TAGGING
0037 " ANALYTICAL TECHNIQUES, SOURCE IDENTIFICATION, SEA SURFACE, SAMPLING, *SPECTROPHOTOMETRY
0100 " BLOWOUTS, *BLOWOUT CONTROL, OFFSHORE DRILLING, EQUIPMENT
0114 " CRUDE OIL, BIRDS, BIOLOGICAL EFFECTS, *FLUOROMETRY, *ANAS PLATYRHYNCHOS, *EGGS
0142 " BASELINE STUDIES, HYDROCARBONS , OFFSHORE PRODUCTION, PLATFORMS, OIL DISCHARGES, ENVIRONMENTAL EFFECTS, GULF OF MEXICO, *ALKANES
0240 " DESIGN-ENGINEERING, PIPELINES, EQUIPMENT, MONITORING, LEAKAGE, PRODUCT INFORMATION
R001 " BIOINDICATORS, BIOASSAY, ALGAE, HYDROCARBONS , PETROLEUM PRODUCTS, TOXICITY
R002 " REMOTE SENSING, MONITORING, OIL SPILLS, EQUIPMENT, *SPILL RESPONSE
R003 " REMOTE SENSING, MONITORING, EQUIPMENT, OIL SPILLS, *SPILL RESPONSE
0126 DEVELOPMENT , CRUDE OIL, CONTAMINATION, BIOLOGICAL EFFECTS, BALTIC SEA, WSF, HYDROCARBONS , FISH, TOXICITY, MORTALITY, *EGGS, *LARVAE, FUEL OIL
0133 " BIOLOGICAL EFFECTS, BIOASSAY, HYDROCARBONS , WSF, FUEL OIL, INVERTEBRATES, POLYCHAETES, *RESISTANCE, *INHERITANCE OF RESISTANCE, *NEANTHES ARENACEODENTATA
0161 " OIL TERMINALS, ENVIRONMENTAL EFFECTS, ONSHORE IMPACTS, POLLUTION PREVENTION, NORTH SEA, *SHETLAND
0209 " CANADA, BEAUFORT SEA, ARCTIC, OIL TRANSPORT, OIL INDUSTRY, EXPLORATION , FOREIGN GOVERNMENTS, ECONOMICS, SOCIOECONOMIC EFFECTS, ENVIRONMENTAL EFFECTS, TANKERS, ICE
0211 " ALASKA , INLAND, EIS, US GOVERNMENT, *DEVELOPMENT BAN
0227 " BIBLIOGRAPHIES, OIL SHALE, EXPLORATION , ENVIRONMENTAL EFFECTS
0229 " BASELINE STUDIES, ECOSYSTEMS, PIPELINES, OIL SPILLS, ENVIRONMENTAL EFFECTS, *CONFERENCE
R005 " BIOLOGICAL EFFECTS, ARCTIC, PIPELINES, MAMMALS, FOOD WEB, HABITATS, ENVIRONMENTAL EFFECTS
0028 DISPERSANTS, BIOASSAY, ALGAE, TOXICITY, MORTALITY, PHYTOPLANKTON, *POPULATION GROWTH RATES, *CHLAMYDOMONAS, *COREXIT 9527
0046 " CALIFORNIA, API, SPILL CLEANUP, EPA, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0050 " SPILL CLEANUP, FUELS , PRODUCT INFORMATION
0051 " EQUIPMENT, TOXICITY, SPILL CLEANUP, PRODUCT INFORMATION, *COREXIT 9527
0058 " ABSORPTION, SPILL CLEANUP, REUSE, SORBENTS, *POLYURETHANE FOAM
0069 " SPILL CLEANUP, SPILL REMOVAL, PRODUCT INFORMATION
0071 " CONTINGENCY PLANNING, CALIFORNIA, API, OIL SLICKS, SPILL CONTAINMENT, SPILL REMOVAL, EQUIPMENT, SKIMMERS, ENVIRONMENTAL EFFECTS, PERSONNEL TRAINING, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0099 " SPILL CLEANUP, POLLUTION PREVENTION, EMULSIFIERS, PRODUCT INFORMATION
0104 " CRUSTACEANS, CONTAMINATION, BIOLOGICAL EFFECTS, TOXICITY, FRESHWATER, INVERERTEBRATES, MOLLUSKS, HYDROCARBONS
0106 " BOOMS, BIRDS, MORTALITY, SPILL CLEANUP, TANKERS, *SHETLAND ISLANDS, *ESSO BERNICA SPILL
0116 " BIOLOGICAL EFFECTS, ALGAE, TOXICITY, *CHLAMYDOMONAS REINHARDTI, *DUNALIELLA MARINA
0135 " BIOLOGICAL EFFECTS, TOXICITY, MARINE ORGANISMS, FISH, MOLLUSKS, *CLAMS
0284 " WASTEWATER TREATMENT, OIL-WATER SEPARATION, SURFACTANTS, *MAGNETIC SEPARATION, PATENT
0321 " CRUDE OIL, OIL SPILLS, TANKERS, OIL SLICKS, SPREADING, SPILL CLEANUP, SPAIN, *ANDROS PATRIA SPILL
0332 " TANKERS, SPILL CLEANUP, OIL SPILLS, IRELAND, *BANTRY BAY, *BETELGEUSE SPILL
0146 DISPERSION, DECOMPOSITION, CONTINGENCY PLANNING, ALASKA , OIL SPILLS, FATE, PREDICTION, SHORELINES, ENVIRONMENTAL EFFECTS, OFFSHORE DEVELOPMENT, *COOK INLET
0191 " MODELS, PREDICTION, FATE, NORTH SEA
0194 " COASTAL WATERS, ALASKA , MOVEMENT, OIL SPILLS, MODELS, FATE, SPILL TRAJECTORIES, PREDICTIONS, *WIND FIELDS
R009 " CHEMICAL EFFECTS, OIL SLICKS, EMULSIONS, PHYSICAL EFFECTS, *WAVE ACTION
0261 DISPOSAL , WASTEWATER TREATMENT, OFFSHORE PRODUCTION, SANTA BARBARA CHANNEL, *ONSHORE TREATMENT FACILITY
0264 " WASTEWATERS, SOIL, *UNDERGROUND WATER INJECTION, GERMANY
0265 " COST ANALYSIS, WASTE OIL, SOURCES, MARINE ENVIRONMENT, *ENGINEERING, REGULATIONS, OIL DISCHARGES, TANKERS, REFINING, NATURAL SEEPAGE, SLUDGE
0268 " BALLAST , OIL-WATER SEPARATION, TANKERS, WASTEWATER TREATMENT, EQUIPMENT, MEDITERRANEAN SEA
0024 DISTRIBUTION, DETECTION, DEEPWATER PORTS, CHEMICAL ANALYSIS, SAMPLING, *FLOUROMETRY, MONITORING, LOUISIANA, EQUIPMENT, USCG
0137 " CHROMATOGRAPHY, CHEMICAL ANALYSIS, BENTHOS, HYDROCARBONS , SEDIMENTS, RHODE ISLAND, *RHODE ISLAND SOUND, *ARCTICA ISLANDICA

0140 DISTRIBUTION, BEACHES, OIL SPILLS, SEDIMENTATION, FATE, SHORELINES, ENVIRONMENTAL EFFECTS, ONSHORE IMPACTS, URQUIOLA SPILL
0141 " HYDROCARBONS , NATURAL SEEPAGE, PHYSICAL EFFECTS, SANTA BARBARA CHANNEL, *SALINITY
0145 " BIOGENIC HYDROCARBONS, BENTHOS, ANTARCTICA, HYDROCARBONS , ENVIRONMENTAL EFFECTS, FISH, SEDIMENTS, *N-ALKANES
0168 " CONTAMINATION, AFRICA, MARINE ENVIRONMENTS, *SOUTH SAMPLING
0185 " BIODEGRADATION, BEAUFORT SEA, BASELINE STUDIES, ALASKA , MICROORGANISMS, HYDROCARBONS , *BIODEGRADATION POTENTIAL, OCS, GULF OF ALASKA
0189 " CHEMICAL ANALYSIS, CALIFORNIA, PLATFORMS, HYDROCARBONS , FATE, SAMPLING, FISH, SANTA BARBARA CHANNEL
0198 " AROMATIC HYDROCARBONS, OCEANS, HYDROCARBONS , PAH, SOURCES, GC/MS
0221 " BIOLOGICAL EFFECTS, BIOASSAY, ALASKA , DRILLING , PHYSICAL EFFECTS, SAMPLING, MARINE ORGANISMS
0224 " CORAL REEFS, MONITORING, DRILLING , EXPLORATION , ENVIRONMENTAL EFFECTS, OCS, GULF OF MEXICO
0193 DRIFT, BEHAVIOR, MOVEMENT, OIL SLICKS, MODELS, PREDICTION, FATE, STRAIT OF MAGELLAN
0201 DRILLING , PRODUCTION , INLAND, US, GROUNDWATER, MONITORING, *AQUIFERS, ENVIRONMENTAL EFFECTS, *SALT WATER INJECTION OPERATIONS
0202 " ENVIRONMENTAL PROTECTION, INLAND, GROUNDWATER, *AQUIFERS, POLLUTION PREVENTION
0219 " OFFSHORE PRODUCTION, TEXAS, ENVIRONMENTAL EFFECTS, *BRINE DISPOSAL POLICY
0221 " DISTRIBUTION, BIOLOGICAL EFFECTS, BIOASSAY, ALASKA , PHYSICAL EFFECTS, SAMPLING, MARINE ORGANISMS
0224 " DISTRIBUTION, CORAL REEFS, MONITORING, EXPLORATION , ENVIRONMENTAL EFFECTS, OCS, GULF OF MEXICO
0112 ECONOMIC EFFECTS, CONTAMINATION, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BIOASSAY, AUSTRALIA, UPTAKE, METABOLISM, FATE, HYDROCARBONS , FISH, FISHERIES, *MUGIL CEPHALUS
0153 " CONTAMINATION, COASTAL WATERS, BASELINE STUDIES, ENVIRONMENTAL EFFECTS, ESTUARIES, WASHINGTON, *SENSITIVITY RATING
0165 " AUSTRALIA, POLLUTION PREVENTION, OIL SPILLS, LEGISLATION, INTERNATIONAL CONVENTIONS
0225 " BLOWOUTS, RISK ANALYSIS, OFFSHORE DEVELOPMENT, ENVIRONMENTAL EFFECTS, SPILL CLEANUP, EQUIPMENT, NORTH SEA
0330 " SHIPS, FUEL OIL, OIL SPILLS, ENVIRONMENTAL EFFECTS, JAPAN, SPILL CLEANUP, *JUPITER GAS SPILL
0063 ECONOMICS, BIOLOGICAL EFFECTS, ARCTIC, SPILL CLEANUP, SUBARCTIC REGIONS, EVNIRONMENTAL EFFECTS
0206 " OIL INDUSTRY, ENVIRONMENTAL PROTECTION, POLLUTION CONTROL, EXPLORATION , PRODUCTION , REFINING
0207 " PETROCHEMICALS, INDUSTRIES, WASTEWATER TREATMENT, EUROPE
0208 " COST ANALYSIS, API, REFINERIES, ENVIRONMENTAL PROTECTION, POLLUTION PREVENTION, POLLUTION CONTROL, FATE, ENVIRONMENTAL EFFECTS
0209 " DEVELOPMENT , CANADA, BEAUFORT SEA, ARCTIC, OIL TRANSPORT, OIL INDUSTRY, EXPLORATION , FOREIGN GOVERNMENTS, SOCIOECONOMIC EFFECTS, ENVIRONMENTAL EFFECTS, TANKERS, ICE
0236 " COASTAL WATERS, CANADA, PIPELINES, US, ENVIRONMENTAL PROTECTION, TANKERS, *BRITISH COLUMBIA, *KITIMAT PIPELINE
0299 " CRANKCASE OIL, COST ANALYSIS, RECLAMATION, WASTE OIL, LUBRICATING OIL, REFINING, RECYCLING
0163 ECOSYSTEMS, BEAUFORT SEA, BASELINE STUDIES, ALASKA , OCS, NOAA, ENVIRONMENTAL EFFECTS, *ECOSYSTEM PROCESS ANALYSIS
0164 " COASTS, ENVIRONMENTAL MANAGEMENT, GOVERNMENT AGENCIES, INFORMATION SYSTEMS, MODELS, *ECOLOGICAL CHARACTERIZATION
0229 " DEVELOPMENT , BASELINE STUDIES, PIPELINES, OIL SPILLS, ENVIRONMENTAL EFFECTS, *CONFERENCE
0157 EIS, OCS, USGS, REGULATIONS, OFFSHORE EXPLORATION, OFFSHORE PRODUCTION
0159 " BLM, BASELINE STUDIES, USGS, ENVIRONMENTAL EFFECTS, OCS, OIL-GAS LEASING, GULF OF MEXICO, *MAFLA AREA
0211 " DEVELOPMENT , ALASKA , INLAND, US GOVERNMENT, *DEVELOPMENT BAN
0214 " OCS, OFFSHORE DEVELOPMENT, OIL-GAS LEASING, OIL INDUSTRY, US GOVERNMENT, GEORGES BANK, *LEASE SALE CANCELLATION
0215 " REGULATIONS, US GOVERNMENT, OFFSHORE EXPLORATION, OFFSHORE DRILLING, OFFSHORE PRODUCTION
0016 EKOFISK BLOWOUT, CONCENTRATIONS, CHEMICAL ANALYSIS, NORTH SEA, SWEDEN
0111 " CRUSTACEANS, CRUDE OIL, BIOLOGICAL EFFECTS, WSF, HYDROCARBONS , PLANKTON, FOOD WEB, *ZOEAL LARVAE, *HYAS ARANEUS
0049 EMULSIFICATION, BIODEGRADATION, SURFACTANTS, SEAWATER, OIL SLICKS, OIL REMOVAL, *SALINITY
0099 EMULSIFIERS, DISPERSANTS, SPILL CLEANUP, POLLUTION PREVENTION, PRODUCT INFORMATION
0267 " *DETERGENTS, PATENT
0263 EMULSIONS, COALESCENCE, WASTEWATER TREATMENT, OIL-WATER SEPARATION, EQUIPMENT, FILTRATION, PRODUCT INFORMATION
0295 " OIL-WATER SEPARATION, WASTEWATERS, SURFACTANTS, PATENT, *OZONATION
R009 " DISPERSION, CHEMICAL EFFECTS, OIL SLICKS, PHYSICAL EFFECTS, *WAVE ACTION
0110 ENVIRONMENTAL DETERIORATION, CONSERVATION, BIOLOGICAL EFFECTS, BALLAST , HABITATS, ENVIRONMENTAL PROTECTION, UN, RESOURCE MANAGEMENT, MEDITERRANEAN SEA, *ENDANGERED SPECIES, *UNEP, *IUCN

0003 ENVIRONMENTAL EFFECTS, BASELINE STUDIES, MONITORING, NOAA, MARINE ORGANISMS, MODELS, STORAGE, STRATEGIC PETROLEUM RESERVE, GULF OF MEXICO, *BRINE DISPOSAL

0008 " CRUSTACEANS, CHEMICAL ANALYSIS, BENTHOS, MONITORING, HYDROCARBONS , FOOD WEB, OFFSHORE DRILLING, OCS, TEXAS, GULF OF MEXICO

0071 " DISPERSANTS, CONTINGENCY PLANNING, CALIFORNIA, API, OIL SLICKS, SPILL CONTAINMENT, SPILL REMOVAL, EQUIPMENT, SKIMMERS, PERSONNEL TRAINING, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION

0088 " CORAL REEFS, CONTINGENCY PLANNING, COASTS, COASTAL ZONE MANAGEMENT, BEACHES, SHORELINES, MARSHES, OIL SPILLS, SPILL CLEANUP, *COASTAL VULNERABILITY INDEX

0108 " CRUDE OIL, CRANKCASE OIL, CHRONIC EFFECTS, BIOMASS, BIOLOGICAL EFFECTS, ALGAE, ACUTE EFFECTS, WSF, TOXICITY, FUEL OIL

0140 " DISTRIBUTION, BEACHES, OIL SPILLS, SEDIMENTATION, FATE, SHORELINES, ONSHORE IMPACTS, URQUIOLA SPILL

0142 " DETECTION, BASELINE STUDIES, HYDROCARBONS , OFFSHORE PRODUCTION, PLATFORMS, OIL DISCHARGES, GULF OF MEXICO, *ALKANES

0145 " DISTRIBUTION, BIOGENIC HYDROCARBONS, BENTHOS, ANTARCTICA, HYDROCARBONS , FISH, SEDIMENTS, *N-ALKANES

0146 " DISPERSION, DECOMPOSITION, CONTINGENCY PLANNING, ALASKA , OIL SPILLS, FATE, PREDICTION, SHORELINES, OFFSHORE DEVELOPMENT, *COOK INLET

0150 " COASTS, MONITORING, HYDROCARBONS , *SOUTHERN CALIFORNIA BIGHT, *SCCWRP

0152 " CONSERVATION, BIRDS, BASELINE STUDIES, ALASKA , WILDLIFE, HABITATS, OFFSHORE DEVELOPMENT, RESOURCE MANAGEMENT, OIL SPILLS, *ANSER CANAGICUS

0153 " ECONOMIC EFFECTS, CONTAMINATION, COASTAL WATERS, BASELINE STUDIES, ESTUARIES, WASHINGTON, *SENSITIVITY RATING

0154 " BLM, BASELINE STUDIES, OCS, OFFSHORE DEVELOPMENT, *ENVIRONMENTAL STUDIES PROGRAM

0155 " CALIFORNIA, BLM, BASELINE STUDIES, OCS, PACIFIC OCEAN *

0159 " EIS, BLM, BASELINE STUDIES, USGS, OCS, OIL-GAS LEASING, GULF OF MEXICO, *MAFLA AREA

0161 " DEVELOPMENT , OIL TERMINALS, ONSHORE IMPACTS, POLLUTION PREVENTION, NORTH SEA, *SHETLAND

0163 " ECOSYSTEMS, BEAUFORT SEA, BASELINE STUDIES, ALASKA , OCS, NOAA, *ECOSYSTEM PROCESS ANALYSIS

0169 " CALIFORNIA, SOURCES, OIL SPILLS, MODELS, OCS, SPILL TRAJECTORIES, *ANALYTICAL METHODOLOGY

0172 " OIL SPILLS, OFFSHORE DEVELOPMENT, PIPELINES

0173 " CHRONIC EFFECTS, BIRDS, SOURCES, OIL DISCHARGES, MARINE ENVIRONMENT, ESTUARIES, FISHERIES, COASTAL WATER, *SEABIRDS

0201 " DRILLING , PRODUCTION , INLAND, US, GROUNDWATER, MONITORING, *AQUIFERS, *SALT WATER INJECTION OPERATIONS

0208 " ECONOMICS, COST ANALYSIS, API, REFINERIES, ENVIRONMENTAL PROTECTION, POLLUTION PREVENTION, POLLUTION CONTROL, FATE

0209 " ECONOMICS, DEVELOPMENT , CANADA, BEAUFORT SEA, ARCTIC, OIL TRANSPORT, OIL INDUSTRY, EXPLORATION , FOREIGN GOVERNMENTS, SOCIOECONOMIC EFFECTS, TANKERS, ICE

0210 " OFFSHORE EXPLORATION, OFFSHORE DRILLING, GREENLAND, SOCIOECONOMIC EFFECTS, FISHERIES, *EUROPEAN ECONOMIC COMMUNITY

0218 " BLM, OCS, OFFSHORE EXPLORATION, OFFSHORE PRODUCTION, GULF OF MEXICO

0219 " DRILLING , OFFFSHORE PRODUCTION, TEXAS, *BRINE DISPOSAL POLICY

0222 " BIBLIOGRAPHIES, UK, NORTH SEA, OFFSHORE DEVELOPMENT, ONSHORE IMPACTS, *SCOTLAND LIBRARIES

0223 " ALASKA , ERDA, GOVERNMENT AGENCIES, OFFSHORE DEVELOPMENT, *ENVIRONMENTAL RESEARCH PROGRAMS, *PASS-THROUGH PROGRAM

0224 " DRILLING , DISTRIBUTION, CORAL REEFS, MONITORING, EXPLORATION , OCS, GULF OF MEXICO

0225 " ECONOMIC EFFECTS, BLOWOUTS, RISK ANALYSIS, OFFSHORE DEVELOPMENT, SPILL CLEANUP, EQUIPMENT, NORTH SEA

0227 " DEVELOPMENT , BIBLIOGRAPHIES, OIL SHALE, EXPLORATION

0229 " ECOSYSTEMS, DEVELOPMENT , BASELINE STUDIES, PIPELINES, OIL SPILLS, *CONFERENCE

0230 " COASTAL WATERS, OFFSHORE DRILLING, US, *DRILLING MUD, *CUTTINGS

0254 " CANADA, PORTS , OIL TERMINALS, TANKERS, SAFETY, *BRITISH COLUMBIA, *KITIMAT OIL PORT, *INQUIRY

0257 " CRUDE OIL, TRANS-ALASKA PIPELINE, OIL TRANSFER, OIL TERMINALS, OIL INDUSTRY, TANKERS, PIPELINES, LEGISLATION

0309 " BOOMS, BIRDS, BEACHES, SPILL CONTAINMENT, SPILL CLEANUP, TANKERS, OIL TERMINALS, RELEASE, MORTALITY, SCOTLAND

0330 " ECONOMIC EFFECTS, SHIPS, FUEL OIL, OIL SPILLS, JAPAN, SPILL CLEANUP, *JUPITER GAS SPILL

0342 " CONTAMINATION, COMPENSATION, CHRONIC EFFECTS, LIABILITY, REGULATIONS, LEGISLATION, *CONFERENCE PANEL DISCUSSION

R005 " DEVELOPMENT , BIOLOGICAL EFFECTS, ARCTIC, PIPELINES, MAMMALS, FOOD WEB, HABITATS

R008 " BASELINE STUDIES, HYDROCARBONS , OIL SPILLS, MODELS, SPILL TRAJECTORIES, PUGET SOUND, STRAIT OF MAGELLAN

0098 ENVIRONMENTAL MANAGEMENT, INTERNATIONAL AGREEMENTS, INTERNATIONAL CONVENTIONS, POLLUTION CONTROL, UN, MEDITERRANEAN SEA, *MEDITERRANEAN ACTION PLAN, *UNEP

0164 " ECOSYSTEMS, COASTS, GOVERNMENT AGENCIES, INFORMATION SYSTEMS, MODELS, *ECOLOGICAL CHARACTERIZATION

0110 ENVIRONMENTAL PROTECTION, ENVIRONMENTAL DETERIORATION, CONSERVATION, BIOLOGICAL EFFECTS, BALLAST , HABITATS, UN, RESOURCE MANAGEMENT, MEDITERRANEAN SEA, *ENDANGERED SPECIES, *UNEP, *IUCN
0202 " DRILLING , INLAND, GROUNDWATER, *AQUIFERS, POLLUTION PREVENTION
0206 " ECONOMICS, OIL INDUSTRY, POLLUTION CONTROL, EXPLORATION , PRODUCTION , REFINING
0208 " ENVIRONMENTAL EFFECTS, ECONOMICS, COST ANALYSIS, API, REFINERIES, POLLUTION PREVENTION, POLLUTION CONTROL, FATE
0236 " ECONOMICS, COASTAL WATERS, CANADA, PIPELINES, US, TANKERS, *BRITISH COLUMBIA, *KITIMAT PIPELINE
0044 EPA, API, *FIELD TESTS, OIL SPILLS, *CHEMICAL TREATMENT AGENTS
0046 " DISPERSANTS, CALIFORNIA, API, SPILL CLEANUP, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0067 " SPILL CLEANUP, SHIPS, IRELAND, *OIL RECOVERY VESSEL, EQUIPMENT, SKIMMERS, *OHMSETT FACILITY
0090 " REGULATIONS, US GOVERNMENT, GOVERNMENT AGENCIES, *FWPCA, SPILL CLEANUP, OIL DISCHARGES, LIABILITY
0213 " EXTRACTION, OCEANS, RESOURCE MANAGEMENT, GOVERNMENT AGENCIES
0001 EQUIPMENT, DESIGN-ENGINEERING, BALLAST , MONITORING, TANKERS, OIL DISCHARGES
0004 " CONTAMINATION, MONITORING, REMOTE SENSING, ICE, *TRACKING BUOYS
0006 " BALLAST , MONITORING, HYDROCARBONS , TANKERS, OIL DISCHARGES, LAW ENFORCEMENT, INTERNATIONAL AGREEMENTS, POLLUTION CONTROL
0009 " MONITORING, PRODUCT INFORMATION, *UV ANALYZER, *OIL-IN-WATER
0021 " ANALYTICAL TECHNIQUES, SAMPLING, OIL-WATER SEPARATION, *QUANTITATIVE FIELD METHOD
0024 " DISTRIBUTION, DETECTION, DEEPWATER PORTS, CHEMICAL ANALYSIS, SAMPLING, *FLOUROMETRY, MONITORING, LOUISIANA, USCG
0042 " DESIGN-ENGINEERING, BOOMS, SPILL CONTAINMENT, PATENT
0045 " SPILL CLEANUP, SPILL REMOVAL, SPILL CONTAINMENT, SKIMMERS, USCG
0047 " SPILL CLEANUP, SPILL CONTAINMENT, RIVERS, OREGON, POLLUTION CONTROL, *CLEANUP SERVICE
0048 " DESIGN-ENGINEERING, SPILL CLEANUP, SURFACTANTS, PATENT
0051 " DISPERSANTS, TOXICITY, SPILL CLEANUP, PRODUCT INFORMATION, *COREXIT 9527
0055 " BOOMS, SPILL CONTAINMENT, SPILL CLEANUP, SPILL REMOVAL, PRODUCT INFORMATION, SKIMMERS
0056 " CANADA, BOOMS, PRODUCT INFORMATION, *EEQ ANTI-POLLUTION BARGE
0057 " SPILL CLEANUP, SPILL REMOVAL, PATENT
0061 " OIL SLICKS, SPILL CLEANUP, OIL-WATER SEPARATION, PATENT
0064 " DESIGN-ENGINEERING, SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION
0065 " SPILL CLEANUP, WASTEWATERS, SKIMMERS, PRODUCT INFORMATION
0066 " SPILL CLEANUP, SPILL REMOVAL, SKIMMERS, PRODUCT INFORMATION
0067 " EPA, SPILL CLEANUP, SHIPS, IRELAND, *OIL RECOVERY VESSEL, SKIMMERS, *OHMSETT FACILITY
0068 " POLLUTION CONTROL, SKIMMERS, PRODUCT INFORMATION, SPILL REMOVAL
0070 " SPILL CLEANUP, LAKES , OIL REMOVAL, PETROLEUM PRODUCTS, *LAKE MARACAIBO
0071 " ENVIRONMENTAL EFFECTS, DISPERSANTS, CONTINGENCY PLANNING, CALIFORNIA, API, OIL SLICKS, SPILL CONTAINMENT, SPILL REMOVAL, SKIMMERS, PERSONNEL TRAINING, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0072 " DESIGN-ENGINEERING, CANADA, SPILL CLEANUP, SPILL REMOVAL, SKIMMERS, *PUMPS
0079 " BOOK REVIEW, SPILL CLEANUP, OIL REMOVAL
0082 " BLOWOUT PREVENTION, PERSONNEL TRAINING, OCS, OFFSHORE DRILLING, REGULATIONS, USGS, SAFETY, POLLUTION PREVENTION, PLATFORMS, *STANDARDS
0085 " DESIGN-ENGINEERING, CONTINGENCY PLANNING, SKIMMERS, USN, *SKIMMER MODIFICATIONS
0093 " BOOMS, POLLUTION PREVENTION, POLLUTION CONTROL, SPILL CLEANUP, SORBENTS, SPILL CONTAINMENT, *UNDERWATER CANOPY, PRODUCT INFORMATION
0094 " BLOWOUTS, NATURAL SEEPAGE, SANTA BARBARA CHANNEL, LEAKAGE, PLATFORMS, SPILL CONTAINMENT, *SUBMERGED TENTS
0095 " POLLUTION PREVENTION, PRODUCT INFORMATION, *OIL STOP VALVE
0100 " DETECTION, BLOWOUTS, *BLOWOUT CONTROL, OFFSHORE DRILLING
0102 " CONTINGENCY PLANNING, CALIFORNIA, MONITORING, OIL SPILLS, LIABILITY, POLLUTION CONTROL, SPILL CLEANUP, FISH, WILDLIFE, WATER QUALITY, *DEPARTMENT OF FISH AND GAME
0225 " ENVIRONMENTAL EFFECTS, ECONOMIC EFFECTS, BLOWOUTS, RISK ANALYSIS, OFFSHORE DEVELOPMENT, SPILL CLEANUP, NORTH SEA
0240 " DETECTION, DESIGN-ENGINEERING, PIPELINES, MONITORING, LEAKAGE, PRODUCT INFORMATION
0250 " USCG, REGULATIONS, SAFETY, TANKERS, *RADAR
0256 " CONTINGENCY PLANNING, BEACH CLEANUP, AMOCO CADIZ SPILL, TANKERS, SPILL CLEANUP, *LITIGATION
0263 " EMULSIONS, COALESCENCE, WASTEWATER TREATMENT, OIL-WATER SEPARATION, FILTRATION, PRODUCT INFORMATION
0268 " DISPOSAL , BALLAST , OIL-WATER SEPARATION, TANKERS, WASTEWATER TREATMENT, MEDITERRANEAN SEA
0279 " WASTEWATER TREATMENT, OIL REMOVAL, SKIMMERS, PRODUCT INFORMATION
0281 " COALESCENCE, WASTE OIL TREATMENT, PRODUCT INFORMATION
0288 " OIL-WATER SEPARATION, PLATFORMS, OFFSHORE PRODUCTION, STORAGE, *PARALLEL PLATE SEPARATORS, *GAS FLOTATION , MONITORING
0289 " COALESCENCE, OIL-WATER SEPARATION, PRODUCT INFORMATION, FILTRATION
0291 " OIL-WATER SEPARATION, GRAVITY SEPARATION, PRODUCT INFORMATION

0293 EQUIPMENT, DESIGN-ENGINEERING, OIL-WATER SEPARATION, WASTEWATER TREATMENT, USN
0294 " DESIGN-ENGINEERING, OIL-WATER SEPARATION, WASTEWATER TREATMENT, PATENT
0296 " OIL-WATER SEPARATION, PRODUCT INFORMATION
0297 " OIL-WATER SEPARATION, PRODUCT INFORMATION
0301 " OIL TRANSFER, TANKERS, SPILL CLEANUP, SHORELINES, OIL SPILLS, OIL SLICKS, *ANDROS PATRIA SPILL
0310 " TAR, SHIPS, SPILL CLEANUP, SORBENTS, MISSISSIPPI RIVER, LOUISIANA
0322 " CRUDE OIL, TANKERS, OIL TRANSFER, OIL SPILLS, SHORELINES, SPILL CLEANUP, SPAIN, *ANDROS PATRIA SPILL
0339 " DESIGN-ENGINEERING, BOOMS, SPILL CLEANUP, SORBENTS, MONITORING, NORWAY
0341 " REFINERIES, *WASTE TREATMENT, POLLUTION CONTROL, MONITORING, *SOURCE CONTROL
R002 " DETECTION, REMOTE SENSING, MONITORING, OIL SPILLS, *SPILL RESPONSE
R003 " DETECTION, REMOTE SENSING, MONITORING, OIL SPILLS, *SPILL RESPONSE
0223 ERDA, ENVIRONMENTAL EFFECTS, ALASKA , GOVERNMENT AGENCIES, OFFSHORE DEVELOPMENT, *ENVIRONMENTAL RESEARCH PROGRAMS, *PASS-THROUGH PROGRAM
0084 ESTUARIES, CRUDE OIL, CONTINGENCY PLANNING, OIL TERMINALS, UK, SPILL CLEANUP, *AMLWCH SPILL
0153 " ENVIRONMENTAL EFFECTS, ECONOMIC EFFECTS, CONTAMINATION, COASTAL WATERS, BASELINE STUDIES, WASHINGTON, *SENSITIVITY RATING
0173 " ENVIRONMENTAL EFFECTS, CHRONIC EFFECTS, BIRDS, SOURCES, OIL DISCHARGES, MARINE ENVIRONMENT, FISHERIES, COASTAL WATER, *SEABIRDS
0174 " BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, OCEANS, FATE, MARINE ORGANISMS, *LITERATURE REVIEW
R006 " CARCINOGENS, BIOLOGICAL EFFECTS, BIOINDICATORS, AQUATIC ENVIRONMENT, HYDROCARBONS , *BENZOPYRENE
0167 EUROPE, WASTEWATERS, WASTEWATER TREATMENT, REFINERIES, POLLUTION CONTROL, *CONCAWE
0207 " ECONOMICS, PETROCHEMICALS, INDUSTRIES, WASTEWATER TREATMENT
0238 " PIPELINES, OIL SPILLS, OIL INDUSTRY, *CONCAWE
0196 EVAPORATION, BIODEGRADATION, AROMATIC HYDROCARBONS, ABSORPTION, HYDROCARBONS , FATE, WEATHERING, OCEANS, *PELAGIC WATERS
0327 " GASOLINE, OIL SPILLS, NEW YORK, TANKERS, *BARGE ROBERT L. POLING SPILL
0206 EXPLORATION , ENVIRONMENTAL PROTECTION, ECONOMICS, OIL INDUSTRY, POLLUTION CONTROL, PRODUCTION , REFINING
0209 " ENVIRONMENTAL EFFECTS, ECONOMICS, DEVELOPMENT , CANADA, BEAUFORT SEA, ARCTIC, OIL TRANSPORT, OIL INDUSTRY, FOREIGN GOVERNMENTS, SOCIOECONOMIC EFFECTS, TANKERS, ICE
0224 " ENVIRONMENTAL EFFECTS, DRILLING , DISTRIBUTION, CORAL REEFS, MONITORING, OCS, GULF OF MEXICO
0227 " ENVIRONMENTAL EFFECTS, DEVELOPMENT , BIBLIOGRAPHIES, OIL SHALE
0213 EXTRACTION, EPA, OCEANS, RESOURCE MANAGEMENT, GOVERNMENT AGENCIES
0112 FATE, ECONOMIC EFFECTS, CONTAMINATION, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BIOASSAY, AUSTRALIA, UPTAKE, METABOLISM, HYDROCARBONS , FISH, FISHERIES, *MUGIL CEPHALUS
0140 " ENVIRONMENTAL EFFECTS, DISTRIBUTION, BEACHES, OIL SPILLS, SEDIMENTATION, SHORELINES, ONSHORE IMPACTS, URQUIOLA SPILL
0144 " CHRONIC EFFECTS, BIODEGRADATION, BACTERIA, OIL SPILLS, SPILL CLEANUP, MICROORGANISM, SOURCES, *PETROPHILES
0146 " ENVIRONMENTAL EFFECTS, DISPERSION, DECOMPOSITION, CONTINGENCY PLANNING, ALASKA , OIL SPILLS, PREDICTION, SHORELINES, OFFSHORE DEVELOPMENT, *COOK INLET
0147 " CRUDE OIL, BIOLOGICAL EFFECTS, BEACHES, ALASKA , INTERTIDAL ZONE, MARINE ORGANISMS, SEDIMENTS, PHYSICAL EFFECTS, *TIDAL FLATS
0162 " BEHAVIOR, ARCTIC, SPILL CLEANUP, POLLUTION CONTROL, INCINERATION, OIL DISCHARGES, SUBARCTIC REGIONS, *EXPERIMENTAL SPILLS
0174 " ESTUARIES, BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, OCEANS, MARINE ORGANISMS, *LITERATURE REVIEW
0182 " CHEMICAL ANALYSIS, BIODEGRADATION, MICROORGANISMS, HYDROCARBONS , SOIL, GROUNDWATER, WSF, FUEL OIL
0186 " CRUDE OIL, BIODEGRADATION, BAHAMAS, SAMPLING, SEDIMENTS
0188 " CONTAMINATION, FUEL OIL, GROUNDWATER, RIVERS, OIL SPILLS, FRANCE
0189 " DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA, PLATFORMS, HYDROCARBONS , SAMPLING, FISH, SANTA BARBARA CHANNEL
0190 " BEHAVIOR, ARCTIC, ALASKA , MODELS, OIL SLICKS, ICE, PRUDHOE BAY, OFFSHORE DEVELOPMENT, NOAA, *OCSEAP
0191 " DISPERSION, MODELS, PREDICTION, NORTH SEA
0193 " DRIFT, BEHAVIOR, MOVEMENT, OIL SLICKS, MODELS, PREDICTION, STRAIT OF MAGELLAN
0194 " DISPERSION, COASTAL WATERS, ALASKA , MOVEMENT, OIL SPILLS, MODELS, SPILL TRAJECTORIES, PREDICTIONS, *WIND FIELDS
0196 " EVAPORATION, BIODEGRADATION, AROMATIC HYDROCARBONS, ABSORPTION, HYDROCARBONS , WEATHERING, OCEANS, *PELAGIC WATERS
0197 " BIODEGRADATION, NATURAL SEEPAGE, OFFSHORE PRODUCTION, OIL TRANSPORT, PETROLEUM PRODUCTS, OIL DISCHARGES
0208 " ENVIRONMENTAL PROTECTION, ENVIRONMENTAL EFFECTS, ECONOMICS, COST ANALYSIS, API, REFINERIES, POLLUTION PREVENTION, POLLUTION CONTROL
0263 FILTRATION, EQUIPMENT, EMULSIONS, COALESCENCE, WASTEWATER TREATMENT, OIL-WATER SEPARATION, PRODUCT INFORMATION
0289 " EQUIPMENT, COALESCENCE, OIL-WATER SEPARATION, PRODUCT INFORMATION

0017	FISH, BIOLOGICAL EFFECTS, BIOASSAY, ANALYTICAL TECHNIQUES, MONITORING, WASTEWATERS, REFINERIES, WATER QUALITY, TOXICITY, *FREEZE CONCENTRATION TECHNIQUE
0019	" BIODEGRADATION, FOOD WEB, HYDROCARBONS , GC, *BIOLOGICAL HALF LIFE, *N-ALKANES, *BIOMAGNIFICATION, *MUGIL CEPHALUS
0086	" CONTINGENCY PLANNING, US GOVERNMENT, RESOURCE MANAGEMENT, WILDLIFE, GOVERNMENT AGENCIES
0102	" EQUIPMENT, CONTINGENCY PLANNING, CALIFORNIA, MONITORING, OIL SPILLS, LIABILITY, POLLUTION CONTROL, SPILL CLEANUP, WILDLIFE, WATER QUALITY, *DEPARTMENT OF FISH AND GAME
0109	" CONTAMINATION, BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, AQUATIC ENVIRONMENT, FRESHWATER, *LITERATURE REVIEW
0112	" FATE, ECONOMIC EFFECTS, CONTAMINATION, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BIOASSAY, AUSTRALIA, UPTAKE, METABOLISM, HYDROCARBONS , FISHERIES, *MUGIL CEPHALUS
0120	" FUEL OIL, WSF, TOXICITY, MORTALITY, SUBLETHAL EFFECTS, UPTAKE, RELEASE, GROWTH, *JET FUEL
0122	" BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, HYDROCARBONS , SUBLETHAL EFFECTS, UPTAKE, RELEASE, METABOLISM, TOXICITY, *BENZENE, *TOLUENE, *TISSUES
0126	" DEVELOPMENT , CRUDE OIL, CONTAMINATION, BIOLOGICAL EFFECTS, BALTIC SEA, WSF, HYDROCARBONS , TOXICITY, MORTALITY, *EGGS, *LARVAE, FUEL OIL
0129	" CHROMATOGRAPHY, CARCINOGENS, BIOLOGICAL EFFECTS, BIODEGRADATION, AROMATIC HYDROCARBONS, AQUATIC ENVIRONMENT, PAH, METABOLISM
0130	" BIOLOGICAL EFFECTS, TOXICITY
0134	" BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, PAH, HYDROCARBONS , METABOLISM, *HEPATIC MICROSOMAL ENZYMES, *SALMO GAIRDNERI
0135	" DISPERSANTS, BIOLOGICAL EFFECTS, TOXICITY, MARINE ORGANISMS, MOLLUSKS, *CLAMS
0145	" ENVIRONMENTAL EFFECTS, DISTRIBUTION, BIOGENIC HYDROCARBONS, BENTHOS, ANTARCTICA, HYDROCARBONS , SEDIMENTS, *N-ALKANES
0171	" CONTAMINATION, BIRDS, BIOLOGICAL EFFECTS, ARCTIC, MARINE ENVIRONMENT, MARINE ORGANISMS, OIL SPILLS, OFFSHORE DEVELOPMENT, REPRODUCTION, OCS, *REVIEW
0189	" FATE, DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA, PLATFORMS, HYDROCARBONS , SAMPLING, SANTA BARBARA CHANNEL
0200	" BIOLOGICAL EFFECTS, FISHERIES, OCS, OFFSHORE DEVELOPMENT, SANTA BARBARA CHANNEL
R007	" PAH, HYDROCARBONS , UPTAKE, TOXICITY, SUBLETHAL EFFECTS, GROWTHH, RESPIRATION, *HISTOLOGY, INVERTEBRATES, *AUTORADIOGRAPHY
0089	FISHERIES, CONTINGENCY PLANNING, COMPENSATION, OCS, LIABILITY, LEGISLATION, OIL INDUSTRY
0112	" FISH, FATE, ECONOMIC EFFECTS, CONTAMINATION, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BIOASSAY, AUSTRALIA, UPTAKE, METABOLISM, HYDROCARBONS , *MUGIL CEPHALUS
0143	" BIOLOGICAL EFFECTS, OIL SPILLS, SOCIOECONOMIC EFFECTS, *COLUMBIA, *ECUADOR, *ST. PETER SPILL
0173	" ESTUARIES, ENVIRONMENTAL EFFECTS, CHRONIC EFFECTS, BIRDS, SOURCES, OIL DISCHARGES, MARINE ENVIRONMENT, COASTAL WATER, *SEABIRDS
0200	" FISH, BIOLOGICAL EFFECTS, OCS, OFFSHORE DEVELOPMENT, SANTA BARBARA CHANNEL
0210	" ENVIRONMENTAL EFFECTS, OFFSHORE EXPLORATION, OFFSHORE DRILLING, GREENLAND, SOCIOECONOMIC EFFECTS, *EUROPEAN ECONOMIC COMMUNITY
0212	" COMPENSATION, LIABILITY, OCS, OIL-GAS LEASING, LEGISLATION, *OIL SPILL FUND
0276	FLOCCULATION, WASTEWATER TREATMENT, OIL-WATER SEPARATION, PATENT
0008	FOOD WEB, ENVIRONMENTAL EFFECTS, CRUSTACEANS, CHEMICAL ANALYSIS, BENTHOS, MONITORING, HYDROCARBONS , OFFSHORE DRILLING, OCS, TEXAS, GULF OF MEXICO
0019	" FISH, BIODEGRADATION, HYDROCARBONS , GC, *BIOLOGICAL HALF LIFE, *N-ALKANES, *BIOMAGNIFICATION, *MUGIL CEPHALUS
0111	" EKOFISK BLOWOUT, CRUSTACEANS, CRUDE OIL, BIOLOGICAL EFFECTS, WSF, HYDROCARBONS , PLANKTON, *ZOEAL LARVAE, *HYAS ARANEUS
R005	" ENVIRONMENTAL EFFECTS, DEVELOPMENT , BIOLOGICAL EFFECTS, ARCTIC, PIPELINES, MAMMALS, HABITATS
0002	FOREIGN GOVERNMENTS, DETECTION, COASTAL ZONE MANAGEMENT, BALLAST , SURVEILLANCE, OIL DISCHARGES, FRANCE
0032	" CHEMICAL ANALYSIS, CANADA, GUIDELINES, SURVEILLANCE, MONITORING, LEGISLATION, MARINE ENVIRONMENT, OIL DISCHARGES
0092	" MEDITERRANEAN SEA, INTERATIONAL AGREEMENTS, POLLUTION PREVENTION, LAW ENFORCEMENT
0209	" EXPLORATION , ENVIRONMENTAL EFFECTS, ECONOMICS, DEVELOPMENT , CANADA, BEAUFORT SEA, ARCTIC, OIL TRANSPORT, OIL INDUSTRY, SOCIOECONOMIC EFFECTS, TANKERS, ICE
0002	FRANCE, FOREIGN GOVERNMENTS, DETECTION, COASTAL ZONE MANAGEMENT, BALLAST , SURVEILLANCE, OIL DISCHARGES
0166	" COASTS, AMOCO CADIZ SPILL, NOAA, *CNEXO, *ONGOING RESEARCH PROGRAMS
0188	" FATE, CONTAMINATION, FUEL OIL, GROUNDWATER, RIVERS, OIL SPILLS
0335	" COASTS, AMOCO CADIZ SPILL,TANKERS, SPREADING
0104	FRESHWATER, DISPERSANTS, CRUSTACEANS, CONTAMINATION, BIOLOGICAL EFFECTS, TOXICITY, INVERERTEBRATES, MOLLUSKS, HYDROCARBONS
0109	" FISH, CONTAMINATION, BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, AQUATIC ENVIRONMENT, *LITERATURE REVIEW
0180	" CONTAMINATION, BIODEGRADATION, AROMATIC HYDROCARBONS, MICROORGANISMS, PAH, HYDROCARBONS , SEDIMENTS, *TRANSFORMATION RATES
0036	FUEL OIL, DETECTION, CONTAMINATION, SOURCE IDENTIFICATION, LEAKAGE, STORAGE, PETROLEUM PRODUCTS, *TAGGING

0107 FUEL OIL, CRUDE OIL, BIOLOGICAL EFFECTS, ALGAE, WSF, TOXICITY, *MICROALGAE, *PH, *PHOTOSYNTHESIS, *O2 EVOLUTION, SUBLETHAL EFFECTS
0108 " ENVIRONMENTAL EFFECTS, CRUDE OIL, CRANKCASE OIL, CHRONIC EFFECTS, BIOMASS, BIOLOGICAL EFFECTS, ALGAE, ACUTE EFFECTS, WSF, TOXICITY
0113 " CRUSTACEANS, CONCENTRATIONS, BIOASSAY, TOXICITY, SUBLETHAL EFFECTS, MORTALITY, WSF, GULF OF MEXICO, *LUGIA EXOTICA
0118 " CRUDE OIL, CONTAMINATION, CHRONIC EFFECTS, BIRDS, BIOLOGICAL EFFECTS, MORTALITY, TOXICITY, *INGESTION, *ANAS PLATYRHYNCHOS
0120 " FISH, WSF, TOXICITY, MORTALITY, SUBLETHAL EFFECTS, UPTAKE, RELEASE, GROWTH, *JET FUEL
0126 " FISH, DEVELOPMENT , CRUDE OIL, CONTAMINATION, BIOLOGICAL EFFECTS, BALTIC SEA, WSF, HYDROCARBONS , TOXICITY, MORTALITY, *EGGS, *LARVAE
0127 " CRUDE OIL, BIRDS, BIOLOGICAL EFFECTS, METABOLISM, *SALT GLAND, *NACL SECRETION, *LARUS GLAUCESCENS
0133 " DEVELOPMENT , BIOLOGICAL EFFECTS, BIOASSAY, HYDROCARBONS , WSF, INVERTEBRATES, POLYCHAETES, *RESISTANCE, *INHERITANCE OF RESISTANCE, *NEANTHES ARENACEODENTATA
0148 " CALIFORNIA, BIOLOGICAL EFFECTS, OIL SPILLS, RECOVERY, SANSINENA SPILL
0175 " CALIFORNIA, BIOLOGICAL EFFECTS, BASELINE STUDIES, TANKERS, SANSINENA SPILL, PHYSICAL EFFECTS, HARBORS, MARINE ENVIRONMENT
0182 " FATE, CHEMICAL ANALYSIS, BIODEGRADATION, MICROORGANISMS, HYDROCARBONS , SOIL, GROUNDWATER, WSF
0183 " BIODEGRADATION, BIOASSAY, BACTERIA, AROMATIC HYDROCARBONS, MICROORGANISMS, METABOLISM, GROUNDWATER, WSF
0188 " FRANCE, FATE, CONTAMINATION, GROUNDWATER, RIVERS, OIL SPILLS
0304 " TANKERS, SPILL CLEANUP, SPILL RECOVERY, SOUTH CAROLINA, *ARIES SPILL
0305 " OIL TRANSFER, SHIPS, OIL SPILLS, NEW YORK, *CIBRO PHILADELPHIA SPILL
0306 " COASTS, TANKERS, SPILL CLEANUP, SHIPS, PUERTO RICO, *PECK SLIP SPILL
0307 " OIL SPILLS, PIPELINES, SPILL CLEANUP, STREAMS, ICE, RESHWATER, *INDIANA
0312 " ALASKA , SHIPS, OIL SPILLS, USCG, NOAA, USN, *GLACIER QUEEN FERRY SPILL
0314 " BAYS, OIL SPILLS, PUERTO RICO
0316 " CORAL REEFS, BERMUDA, TANKERS, OIL TRANSFER, OIL SPILLS, *MARI BOEING SPILL
0317 " COASTS, BERMUDA, OIL SPILLS, SHIPS, MOVEMENT, SPILL CLEANUP, *MARI BOEING SPILL
0319 " LEAKAGE, SPILL CLEANUP, GASOLINE, USCG, NEW YORK, RECLAMATION, OIL DISCHARGES
0320 " TANKERS, SPILL CLEANUP, SHORELINES, MARSHES, OIL DISCHARGES, MARYLAND, *LANG FONN SPILL
0326 " OIL SPILLS, SHIPS, TANKERS, LEAKAGE, SINGAPORE, SHIP COLLISION
0328 " CANADA, ARCTIC, SHIPS, OIL SPILLS, ICE, *UNDER-ICE SPILL. *ICE BREAKER
0329 " CANADA, ARCTIC, OIL SPILLS, ICE, *AMUNDSEN GULF
0330 " ENVIRONMENTAL EFFECTS, ECONOMIC EFFECTS, SHIPS, OIL SPILLS, JAPAN, SPILL CLEANUP, *JUPITER GAS SPILL
0331 " CARIBBEAN SEA, OIL SPILLS, SHIPS, LEAKAGE, *MASTER MICHAEL SPILL
0333 " SPILL CLEANUP, RIVERS, USGC, MARSHES, TANKERS, SOUTH CAROLINA
0336 " DENMARK, BIRDS, OIL SPILLS, TANKERS, SHORELINES, ICE, MORTALITY, *THUNTANK 3 SPILL
0337 " BEACHES, OIL SPILLS, SHIPS, HARBORS, SCOTLAND
0338 " CONNECTICUT, SPILL CLEANUP, PIPELINES, LIABILITY, USCG, *WEST HAVEN SPILL
0050 FUELS , DISPERSANTS, SPILL CLEANUP, PRODUCT INFORMATION
0302 GASOLINE, TANKERS, SPILL CLEANUP, USCG, LOUISIANA, MISSISSIPPI RIVER, *BARGE GIM 106 SPILL
0319 " FUEL OIL, LEAKAGE, SPILL CLEANUP, USCG, NEW YORK, RECLAMATION, OIL DISCHARGES
0327 " EVAPORATION, OIL SPILLS, NEW YORK, TANKERS, *BARGE ROBERT L. POLING SPILL
0007 GC/MS, DETECTION, AROMATIC HYDROCARBONS, ANALYTICAL TECHNIQUES, PAH, INDUSTRIES, WASTEWATERS
0198 " DISTRIBUTION, AROMATIC HYDROCARBONS, OCEANS, HYDROCARBONS , PAH, SOURCES
0214 GEORGES BANK, EIS, OCS, OFFSHORE DEVELOPMENT, OIL-GAS LEASING, OIL INDUSTRY, US GOVERNMENT, *LEASE SALE CANCELLATION
0086 GOVERNMENT AGENCIES, FISH, CONTINGENCY PLANNING, US GOVERNMENT, RESOURCE MANAGEMENT, WILDLIFE
0087 " CONTINGENCY PLANNING, AMOCO CADIZ SPILL, OIL SPILLS, TORREY CANYON SPILL, POLLUTION CONTROL, SPILL CLEANUP
0090 " EPA, REGULATIONS, US GOVERNMENT, *FWPCA, SPILL CLEANUP, OIL DISCHARGES, LIABILITY
0164 " ENVIRONMENTAL MANAGEMENT, ECOSYSTEMS, COASTS, INFORMATION SYSTEMS, MODELS, *ECOLOGICAL CHARACTERIZATION
0213 " EXTRACTION, EPA, OCEANS, RESOURCE MANAGEMENT
0223 " ERDA, ENVIRONMENTAL EFFECTS, ALASKA , OFFSHORE DEVELOPMENT, *ENVIRONMENTAL RESEARCH PROGRAMS, *PASS-THROUGH PROGRAM
0291 GRAVITY SEPARATION, EQUIPMENT, OIL-WATER SEPARATION, PRODUCT INFORMATION
0158 GREENLAND, BASELINE STUDIES, ARCTIC, OFFSHORE EXPLORATION, OCS, *ENVIRONMENTAL CONDITIONS, ICE
0210 " FISHERIES, ENVIRONMENTAL EFFECTS, OFFSHORE EXPLORATION, OFFSHORE DRILLING, SOCIOECONOMIC EFFECTS, *EUROPEAN ECONOMIC COMMUNITY
0073 GROUNDWATER, BIODEGRADATION, OIL SPILLS, MICROORGANISMS, SOIL, HYDROCARBONS , *BIORECLAMATION
0097 " POLLUTION PREVENTION, LAKES , RIVERS, INLAND, PRODUCT INFORMATION, *IMPERVIOUS UNDERGROUND BARRIER

0138 GROUNDWATER, CONTAMINATION, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, PETROCHEMICALS, POLLUTION PREVENTION
0182 " FUEL OIL, FATE, CHEMICAL ANALYSIS, BIODEGRADATION, MICROORGANISMS, HYDROCARBONS , SOIL, WSF
0183 " FUEL OIL, BIODEGRADATION, BIOASSAY, BACTERIA, AROMATIC HYDROCARBONS, MICROORGANISMS, METABOLISM, WSF
0188 " FUEL OIL, FRANCE, FATE, CONTAMINATION, RIVERS, OIL SPILLS
0201 " ENVIRONMENTAL EFFECTS, DRILLING , PRODUCTION , INLAND, US, MONITORING, *AQUIFERS, *SALT WATER INJECTION OPERATIONS
0202 " ENVIRONMENTAL PROTECTION, DRILLING , INLAND, *AQUIFERS, POLLUTION PREVENTION
0251 " CONTAMINATION, CANADA, PETROCHEMICALS, LEAKAGE, STORAGE, GUIDELINES
0119 GROWTH, CRUDE OIL, BIOLOGICAL EFFECTS, ARCTIC, PHYTOPLANKTON, SUBLETHAL EFFECTS, MORTALITY, *DIATOMS
0120 " FUEL OIL, FISH, WSF, TOXICITY, MORTALITY, SUBLETHAL EFFECTS, UPTAKE, RELEASE, *JET FUEL
0123 " BIOLOGICAL EFFECTS, ALGAE, PETROLEUM PRODUCTS, TOXICITY, *PHOTOSYNTHESIS, *BLUE-GREEN ALGAE
0032 GUIDELINES, FOREIGN GOVERNMENTS, CHEMICAL ANALYSIS, CANADA, SURVEILLANCE, MONITORING, LEGISLATION, MARINE ENVIRONMENT, OIL DISCHARGES
0083 " BLOWOUT PREVENTION, PERSONNEL TRAINING, USGS, POLLUTION PREVENTION, OFFSHORE DRILLING, REGULATIONS, *WELL-CONTROL TRAINING
0251 " GROUNDWATER, CONTAMINATION, CANADA, PETROCHEMICALS, LEAKAGE, STORAGE
0185 GULF OF ALASKA, DISTRIBUTION, BIODEGRADATION, BEAUFORT SEA, BASELINE STUDIES, ALASKA , MICROORGANISMS, HYDROCARBONS , *BIODEGRADATION POTENTIAL, OCS
0003 GULF OF MEXICO, ENVIRONMENTAL EFFECTS, BASELINE STUDIES, MONITORING, NOAA, MARINE ORGANISMS, MODELS, STORAGE, STRATEGIC PETROLEUM RESERVE, *BRINE DISPOSAL
0008 " FOOD WEB, ENVIRONMENTAL EFFECTS, CRUSTACEANS, CHEMICAL ANALYSIS, BENTHOS, MONITORING, HYDROCARBONS , OFFSHORE DRILLING, OCS, TEXAS
0013 " DETECTION, REMOTE SENSING, NATURAL SEEPAGE, MARINE ENVIRONMENT, OCS, TEXAS, LOUISIANA
0113 " FUEL OIL, CRUSTACEANS, CONCENTRATIONS, BIOASSAY, TOXICITY, SUBLETHAL EFFECTS, MORTALITY, WSF, *LUGIA EXOTICA
0142 " ENVIRONMENTAL EFFECTS, DETECTION, BASELINE STUDIES, HYDROCARBONS , OFFSHORE PRODUCTION, PLATFORMS, OIL DISCHARGES, *ALKANES
0159 " ENVIRONMENTAL EFFECTS, EIS, BLM, BASELINE STUDIES, USGS, OCS, OIL-GAS LEASING, *MAFLA AREA
0199 " BIOMASS, PLATFORMS, SAMPLING, DISTRIBUTIONS, WASTEWATERS, OIL FIELDS, *BIOFOULING
0218 " ENVIRONMENTAL EFFECTS, BLM, OCS, OFFSHORE EXPLORATION, OFFSHORE PRODUCTION
0224 " EXPLORATION , ENVIRONMENTAL EFFECTS, DRILLING , DISTRIBUTION, CORAL REEFS, MONITORING, OCS
0241 " DEEPWATER PORTS, OFFSHORE TERMINALS, OIL TRANSFER, TANKERS, TEXAS, POLLUTION PREVENTION
0110 HABITATS, ENVIRONMENTAL PROTECTION, ENVIRONMENTAL DETERIORATION, CONSERVATION, BIOLOGICAL EFFECTS, BALLAST , UN, RESOURCE MANAGEMENT, MEDITERRANEAN SEA, *ENDANGERED SPECIES, *UNEP, *IUCN
0149 " CHRONIC EFFECTS, NATURAL SEEPAGE, SUBLETHAL EFFECTS, MARINE ENVIRONMENT, MARINE ORGANISMS, INVERTEBRATES, SANTA BARBARA CHANNEL
0152 " ENVIRONMENTAL EFFECTS, CONSERVATION, BIRDS, BASELINE STUDIES, ALASKA , WILDLIFE, OFFSHORE DEVELOPMENT, RESOURCE MANAGEMENT, OIL SPILLS, *ANSER CANAGICUS
R005 " FOOD WEB, ENVIRONMENTAL EFFECTS, DEVELOPMENT , BIOLOGICAL EFFECTS, ARCTIC, PIPELINES, MAMMALS
0052 HARBORS, SPILL CLEANUP, SKIMMERS, SHIPS, IRELAND, OIL REMOVAL
0175 " FUEL OIL, CALIFORNIA, BIOLOGICAL EFFECTS, BASELINE STUDIES, TANKERS, SANSINENA SPILL, PHYSICAL EFFECTS, MARINE ENVIRONMENT
0337 " FUEL OIL, BEACHES, OIL SPILLS, SHIPS, SCOTLAND
0005 HYDROCARBONS , COASTAL WATERS, CHEMICAL ANALYSIS, BIOINDICATORS, MONITORING, SAMPLING, MOLLUSKS, *OYSTERS, *MUSSEL WATCH PROGRAM
0006 " EQUIPMENT, BALLAST , MONITORING, TANKERS, OIL DISCHARGES, LAW ENFORCEMENT, INTERNATIONAL AGREEMENTS, POLLUTION CONTROL
0008 " GULF OF MEXICO, FOOD WEB, ENVIRONMENTAL EFFECTS, CRUSTACEANS, CHEMICAL ANALYSIS, BENTHOS, MONITORING, OFFSHORE DRILLING, OCS, TEXAS
0019 " FOOD WEB, FISH, BIODEGRADATION, GC, *BIOLOGICAL HALF LIFE, *N-ALKANES, *BIOMAGNIFICATION, *MUGIL CEPHALUS
0022 " CHROMATOGRAPHY, CHEMICAL ANALYSIS, *DETECTION LIMITS, *SEMICONDUCTOR DETECTORS
0023 " DETECTION, AQUATIC ENVIRONMENT, ANALYTICAL TECHNIQUES
0025 " CONTAMINATION, COASTAL WATERS, ANALYTICAL TECHNIQUES, SAMPLING, ITALY, *TYRRHENIAN SEA
0027 " CONCENTRATIONS, BALTIC SEA, ANALYTICAL TECHNIQUES, SEAWATER, SPECTROSCOPY, MEDITERRANEAN SEA, PACIFIC OCEAN, INDIAN OCEAN, *SEA OF JAPAN , *SEA OF OKHOTSK
0030 " DETECTION, ANALYTICAL TECHNIQUES, ADSORPTION, SPECTROSCOPY, SOURCE IDENTIFICATION, *MOLECULAR SIEVE 5A
0033 " CRUDE OIL, CHROMATOGRAPHY, CHEMICAL ANALYSIS, BIODEGRADATION, BEHAVIOR, *C14 LABELLED ESTER
0073 " GROUNDWATER, BIODEGRADATION, OIL SPILLS, MICROORGANISMS, SOIL, *BIORECLAMATION

0104 HYDROCARBONS , FRESHWATER, DISPERSANTS, CRUSTACEANS, CONTAMINATION, BIOLOGICAL EFFECTS, TOXICITY, INVERERTEBRATES, MOLLUSKS
0105 " CRUSTACEANS, BIOLOGICAL EFFECTS, UPTAKE, METABOLISM, WEST INDIES
0111 " FOOD WEB, EKOFISK BLOWOUT, CRUSTACEANS, CRUDE OIL, BIOLOGICAL EFFECTS, WSF, PLANKTON, *ZOEAL LARVAE, *HYAS ARANEUS
0112 " FISHERIES, FISH, FATE, ECONOMIC EFFECTS, CONTAMINATION, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BIOASSAY, AUSTRALIA, UPTAKE, METABOLISM, *MUGIL CEPHALUS
0115 " BIOLOGICAL EFFECTS, BIOASSAY, AROMATIC HYDROCARBONS, UPTAKE, RELEASE, MOLLUSKS, *TAGGING, *MYTILUS EDULIS
0122 " FISH, BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, SUBLETHAL EFFECTS, UPTAKE, RELEASE, METABOLISM, TOXICITY, *BENZENE, *TOLUENE, *TISSUES
0126 " FUEL OIL, FISH, DEVELOPMENT , CRUDE OIL, CONTAMINATION, BIOLOGICAL EFFECTS, BALTIC SEA, WSF, TOXICITY, MORTALITY, *EGGS, *LARVAE
0131 " BIOLOGICAL EFFECTS, BIOASSAY, ACUTE EFFECTS, TOXICITY, PETROLEUM PRODUCTS, SOLVENTS, METABOLISM, *ALKALINE PHOSPHATASE, *LIPID PEROXIDATION
0132 " CRUSTACEANS, CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, MARINE ORGANISMS, NATURAL SEEPAGE, *EMERITA ANALOGA
0133 " FUEL OIL, DEVELOPMENT , BIOLOGICAL EFFECTS, BIOASSAY, WSF, INVERTEBRATES, POLYCHAETES, *RESISTANCE, *INHERITANCE OF RESISTANCE, *NEANTHES ARENACEODENTATA
0134 " FISH, BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, PAH, METABOLISM, *HEPATIC MICROSOMAL ENZYMES, *SALMO GAIRDNERI
0136 " CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, GLC, MOLLUSKS, MARINE ORGNAISMS, UPTAKE, METABOLISM, *N-ALKANES, *CRASSOSTREA GIGAS, *TAPES JAPONICA
0137 " DISTRIBUTION, CHROMATOGRAPHY, CHEMICAL ANALYSIS, BENTHOS, SEDIMENTS, RHODE ISLAND, *RHODE ISLAND SOUND, *ARCTICA ISLANDICA
0139 " CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, AROMATIC HYDROCARBONS, SOURCES, *SEASONAL VARIATIONS, *BEDFORD BASIN, *NOVA SCOTIA
0141 " DISTRIBUTION, NATURAL SEEPAGE, PHYSICAL EFFECTS, SANTA BARBARA CHANNEL, *SALINITY
0142 " GULF OF MEXICO, ENVIRONMENTAL EFFECTS, DETECTION, BASELINE STUDIES, OFFSHORE PRODUCTION, PLATFORMS, OIL DISCHARGES, *ALKANES
0145 " FISH, ENVIRONMENTAL EFFECTS, DISTRIBUTION, BIOGENIC HYDROCARBONS, BENTHOS, ANTARCTICA, SEDIMENTS, *N-ALKANES
0150 " ENVIRONMENTAL EFFECTS, COASTS, MONITORING, *SOUTHERN CALIFORNIA BIGHT, *SCCWRP
0151 " CHEMICAL ANALYSIS, BLM, BASELINE STUDIES, TEXAS, OCS, MARINE ORGANISMS, SEDIMENTS
0156 " BLM, BENTHOS, BASELINE STUDIES, ATLANTIC OCEAN, OCS, SEDIMENTS, ZOOPLANKTON, NEUSTON
0177 " CRUDE OIL, BIODEGRADATION, BACTERIA, MICROORGANISMS, *ALKANES, *LIPASE ACTIVITY, *ACINETOBACTER LWOFFI
0180 " FRESHWATER, CONTAMINATION, BIODEGRADATION, AROMATIC HYDROCARBONS, MICROORGANISMS, PAH, SEDIMENTS, *TRANSFORMATION RATES
0182 " GROUNDWATER, FUEL OIL, FATE, CHEMICAL ANALYSIS, BIODEGRADATION, MICROORGANISMS, SOIL, WSF
0185 " GULF OF ALASKA, DISTRIBUTION, BIODEGRADATION, BEAUFORT SEA, BASELINE STUDIES, ALASKA , MICROORGANISMS, *BIODEGRADATION POTENTIAL, OCS
0187 " BIODEGRADATION, ALGAE, MICROORGANISMS, *PROTOTHECA, *HYDROCARBON UTILIZATION
0189 " FISH, FATE, DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA, PLATFORMS, SAMPLING, SANTA BARBARA CHANNEL
0196 " FATE, EVAPORATION, BIODEGRADATION, AROMATIC HYDROCARBONS, ABSORPTION, WEATHERING, OCEANS, *PELAGIC WATERS
0198 " GC/MS, DISTRIBUTION, AROMATIC HYDROCARBONS, OCEANS, PAH, SOURCES
0292 " OIL-WATER SEPARATION, WASTEWATERS, PRODUCT INFORMATION
R001 " DETECTION, BIOINDICATORS, BIOASSAY, ALGAE, PETROLEUM PRODUCTS, TOXICITY
R006 " ESTUARIES, CARCINOGENS, BIOLOGICAL EFFECTS, BIOINDICATORS, AQUATIC ENVIRONMENT, *BENZOPYRENE
R007 " FISH, PAH, UPTAKE, TOXICITY, SUBLETHAL EFFECTS, GROWTHH, RESPIRATION, *HISTOLOGY, INVERTEBRATES, *AUTORADIOGRAPHY
R008 " ENVIRONMENTAL EFFECTS, BASELINE STUDIES, OIL SPILLS, MODELS, SPILL TRAJECTORIES, PUGET SOUND, STRAIT OF MAGELLAN
0004 ICE, EQUIPMENT, CONTAMINATION, MONITORING, REMOTE SENSING, *TRACKING BUOYS
0158 " GREENLAND, BASELINE STUDIES, ARCTIC, OFFSHORE EXPLORATION, OCS, *ENVIRONMENTAL CONDITIONS
0190 " FATE, BEHAVIOR, ARCTIC, ALASKA , MODELS, OIL SLICKS, PRUDHOE BAY, OFFSHORE DEVELOPMENT, NOAA, *OCSEAP
0209 " FOREIGN GOVERNMENTS, EXPLORATION , ENVIRONMENTAL EFFECTS, ECONOMICS, DEVELOPMENT CANADA, BEAUFORT SEA, ARCTIC, OIL TRANSPORT, OIL INDUSTRY, SOCIOECONOMIC EFFECTS, TANKERS
0307 " FUEL OIL, OIL SPILLS, PIPELINES, SPILL CLEANUP, STREAMS, RESHWATER, *INDIANA
0328 " FUEL OIL, CANADA, ARCTIC, SHIPS, OIL SPILLS, *UNDER-ICE SPILL, *ICE BREAKER
0329 " FUEL OIL, CANADA, ARCTIC, OIL SPILLS, *AMUNDSEN GULF
0336 " FUEL OIL, DENMARK, BIRDS, OIL SPILLS, TANKERS, SHORELINES, MORTALITY, *THUNTANK 3 SPILL
0237 ILLINOIS, CRUDE OIL, SPILL CLEANUP, SPILL CONTAINMENT, SPILL REMOVAL, LAND FARMING, PIPELINES
0308 " SPILL CLEANUP, PIPELINES, RIVERS

0244 IMCO, BALLAST , TANKERS, SHIPS, INTERNATIONAL CONVENTION, OIL DISCHARGES, POLLUTION PREVENTION
0245 " CRUDE OIL WASHING, TANKERS, SHIPS, SAFETY, INTERNATIONAL CONVENTIONS, POLLUTION PREVENTION, SEGREGATED BALLAST, OIL TRANSPORT
0247 " CRUDE OIL WASHING, US, REGULATION, TANKERS, SEGREGATED BALLAST, INTERNATIONAL AGREEMENTS
0252 " CRUDE OIL WASHING, INTERNATIONAL AGREEMENTS, INTERNATIONAL CONVENTIONS, TANKERS, SAFETY, POLLUTION CONTROL, SEGREGATED BALLAST
0162 INCINERATION, FATE, BEHAVIOR, ARCTIC, SPILL CLEANUP, POLLUTION CONTROL, OIL DISCHARGES, SUBARCTIC REGIONS, *EXPERIMENTAL SPILLS
0027 INDIAN OCEAN, HYDROCARBONS , CONCENTRATIONS, BALTIC SEA, ANALYTICAL TECHNIQUES, SEAWATER, SPECTROSCOPY, MEDITERRANEAN SEA, PACIFIC OCEAN, *SEA OF JAPAN , *SEA OF OKHOTSK
0007 INDUSTRIES, GC/MS, DETECTION, AROMATIC HYDROCARBONS, ANALYTICAL TECHNIQUES, PAH, WASTEWATERS
0207 " EUROPE, ECONOMICS, PETROCHEMICALS, WASTEWATER TREATMENT
0277 " BIODEGRADATION, BACTERIA, PETROCHEMICALS, WASTEWATERS, TOXICITY, *METHANE FERMENTATION, *ANAEROBIC DIGESTION
0287 " OIL-WATER SEPARATION, ULTRAFILTRATION, WASTEWATERS, ISRAEL
0164 INFORMATION SYSTEMS, GOVERNMENT AGENCIES, ENVIRONMENTAL MANAGEMENT, ECOSYSTEMS, COASTS, MODELS, *ECOLOGICAL CHARACTERIZATION
0192 " MODELS, *COMPUTER-ASSISTED METHODOLOGIES
0234 " TANKERS, OIL SPILLS, *1942-1978 SPILLS, STATISTICAL ANALYSIS, *WORLDWIDE SPILL REPORTING NEEDS
0097 INLAND, GROUNDWATER, POLLUTION PREVENTION, LAKES , RIVERS, PRODUCT INFORMATION, *IMPERVIOUS UNDERGROUND BARRIER
0201 " GROUNDWATER, ENVIRONMENTAL EFFECTS, DRILLING , PRODUCTION , US, MONITORING, *AQUIFERS, *SALT WATER INJECTION OPERATIONS
0202 " GROUNDWATER, ENVIRONMENTAL PROTECTION, DRILLING , *AQUIFERS, POLLUTION PREVENTION
0211 " EIS, DEVELOPMENT , ALASKA , US GOVERNMENT, *DEVELOPMENT BAN
0006 INTERNATIONAL AGREEMENTS, HYDROCARBONS , EQUIPMENT, BALLAST , MONITORING, TANKERS, OIL DISCHARGES, LAW ENFORCEMENT, POLLUTION CONTROL
0091 " CONTINGENCY PLANNING, BASELINE STUDIES, INTERNATIONAL CONVENTIONS, UN, MONITORING, LIABILITY, POLLUTION PREVENTION, POLLUTIONCONTROL, MEDITERRANEAN SEA, *MEDITERRANEAN ACTION PLAN, *UNEP
0098 " ENVIRONMENTAL MANAGEMENT, INTERNATIONAL CONVENTIONS, POLLUTION CONTROL, UN, MEDITERRANEAN SEA, *MEDITERRANEAN ACTION PLAN, *UNEP
0233 " TANKERS, SAFETY, POLLUTION PREVENTION, PERSONNEL TRAINING, US GOVERNMENT
0242 " DEEPWATER PORTS, OIL TRANSPORT, OIL TRANSFER, PIPELINES, TANKERS, US, NORWAY, *LOOP
0247 " IMCO, CRUDE OIL WASHING, US, REGULATION, TANKERS, SEGREGATED BALLAST
0248 " COASTAL ZONE MANAGEMENT, UN, OCEANS, LEGISLATION, REGULATIONS, POLLUTION CONTROL, *LAW OF THE SEA
0252 " IMCO, CRUDE OIL WASHING, INTERNATIONAL CONVENTIONS, TANKERS, SAFETY, POLLUTION CONTROL, SEGREGATED BALLAST
0091 INTERNATIONAL CONVENTIONS, INTERNATIONAL AGREEMENTS, CONTINGENCY PLANNING, BASELINE STUDIES, UN, MONITORING, LIABILITY, POLLUTION PREVENTION, POLLUTIONCONTROL, MEDITERRANEAN SEA, *MEDITERRANEAN ACTION PLAN, *UNEP
0098 " INTERNATIONAL AGREEMENTS, ENVIRONMENTAL MANAGEMENT, POLLUTION CONTROL, UN, MEDITERRANEAN SEA, *MEDITERRANEAN ACTION PLAN, *UNEP
0165 " ECONOMIC EFFECTS, AUSTRALIA, POLLUTION PREVENTION, OIL SPILLS, LEGISLATION
0245 " IMCO, CRUDE OIL WASHING, TANKERS, SHIPS, SAFETY, POLLUTION PREVENTION, SEGREGATED BALLAST, OIL TRANSPORT
0249 " UN, SAFETY, REGULATIONS, SHIPS, POLLUTION PREVENTION, *LAW OF THE SEA
0252 " INTERNATIONAL AGREEMENTS, IMCO, CRUDE OIL WASHING, TANKERS, SAFETY, POLLUTION CONTROL, SEGREGATED BALLAST
0147 INTERTIDAL ZONE, FATE, CRUDE OIL, BIOLOGICAL EFFECTS, BEACHES, ALASKA , MARINE ORGANISMS, SEDIMENTS, PHYSICAL EFFECTS, *TIDAL FLATS
0125 INVERTEBRATES, CONTAMINATION, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, BIODEGRADATION, BIBLIOGRAPHIES, BEHAVIOR, ANIMALS, TOXICITY, OIL SPILLS, PLANTS, VERTEBRATES, MARINE ORGANISMS, MICROORGANISMS
0128 " CHRONIC EFFECTS, BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, *PETROL, *BENZENE, *1,2-DICHLOROETHANE, *MUTAGENESIS
0133 " HYDROCARBONS , FUEL OIL, DEVELOPMENT , BIOLOGICAL EFFECTS, BIOASSAY, WSF, POLYCHAETES, *RESISTANCE, *INHERITANCE OF RESISTANCE, *NEANTHES ARENACEODENTATA
0149 " HABITATS, CHRONIC EFFECTS, NATURAL SEEPAGE, SUBLETHAL EFFECTS, MARINE ENVIRONMENT, MARINE ORGANISMS, SANTA BARBARA CHANNEL
R007 " HYDROCARBONS , FISH, PAH, UPTAKE, TOXICITY, SUBLETHAL EFFECTS, GROWTHH, RESPIRATION, *HISTOLOGY, *AUTORADIOGRAPHY
0052 IRELAND, HARBORS, SPILL CLEANUP, SKIMMERS, SHIPS, OIL REMOVAL
0067 " EQUIPMENT, EPA, SPILL CLEANUP, SHIPS, *OIL RECOVERY VESSEL, SKIMMERS, *OHMSETT FACILITY
0313 " CRUDE OIL, OIL SPILLS, TANKERS, OIL TERMINALS, PORTS , SPILL CLEANUP, SHORELINES, *BETELGEUSE SPILL
0324 " TANKERS, OIL SPILLS, *BANTRY BAY, *BETELGEUSE SPILL
0332 " DISPERSANTS,TANKERS, SPILL CLEANUP, OIL SPILLS, *BANTRY BAY, *BETELGEUSE SPILL

0287 ISRAEL, INDUSTRIES, OIL-WATER SEPARATION, ULTRAFILTRATION, WASTEWATERS
0025 ITALY, HYDROCARBONS , CONTAMINATION, COASTAL WATERS, ANALYTICAL TECHNIQUES, SAMPLING, *TYRRHENIAN SEA
0330 JAPAN, FUEL OIL, ENVIRONMENTAL EFFECTS, ECONOMIC EFFECTS, SHIPS, OIL SPILLS, SPILL CLEANUP, *JUPITER GAS SPILL
0070 LAKES , EQUIPMENT, SPILL CLEANUP, OIL REMOVAL, PETROLEUM PRODUCTS, *LAKE MARACAIBO
0097 " INLAND, GROUNDWATER, POLLUTION PREVENTION, RIVERS, PRODUCT INFORMATION, *IMPERVIOUS UNDERGROUND BARRIER
0179 LAND FARMING, BIODEGRADATION, SLUDGE , WASTE DISPOSAL, STORAGE, REFINERIES
0237 " ILLINOIS, CRUDE OIL, SPILL CLEANUP, SPILL CONTAINMENT, SPILL REMOVAL, PIPELINES
0269 " BIODEGRADATION, *WASTE TREATMENT, MICROORGANISMS
0006 LAW ENFORCEMENT, INTERNATIONAL AGREEMENTS, HYDROCARBONS , EQUIPMENT, BALLAST , MONITORING, TANKERS, OIL DISCHARGES, POLLUTION CONTROL
0092 " FOREIGN GOVERNMENTS, MEDITERRANEAN SEA, INTERATIONAL AGREEMENTS, POLLUTION PREVENTION
0253 " CHROMATOGRAPHY, CHEMICAL ANALYSIS, BERMUDA, BALLAST , OIL SPILLS, OIL DISCHARGES, SHIPS, LIABILITY, SOURCE IDENTIFICATION, *CASE STUDY, *LITIGATION
0036 LEAKAGE, FUEL OIL, DETECTION, CONTAMINATION, SOURCE IDENTIFICATION, STORAGE, PETROLEUM PRODUCTS, *TAGGING
0094 " EQUIPMENT, BLOWOUTS, NATURAL SEEPAGE, SANTA BARBARA CHANNEL, PLATFORMS, SPILL CONTAINMENT, *SUBMERGED TENTS
0239 " PIPELINES, OIL TRANSPORT, OIL DISCHARGES
0240 " EQUIPMENT, DETECTION, DESIGN-ENGINEERING, PIPELINES, MONITORING, PRODUCT INFORMATION
0251 " GUIDELINES, GROUNDWATER, CONTAMINATION, CANADA, PETROCHEMICALS, STORAGE
0319 " GASOLINE, FUEL OIL, SPILL CLEANUP, USCG, NEW YORK, RECLAMATION, OIL DISCHARGES
0326 " FUEL OIL, OIL SPILLS, SHIPS, TANKERS, SINGAPORE, SHIP COLLISION
0331 " FUEL OIL, CARIBBEAN SEA, OIL SPILLS, SHIPS, *MASTER MICHAEL SPILL
0032 LEGISLATION, GUIDELINES, FOREIGN GOVERNMENTS, CHEMICAL ANALYSIS, CANADA, SURVEILLANCE, MONITORING, MARINE ENVIRONMENT, OIL DISCHARGES
0089 " FISHERIES, CONTINGENCY PLANNING, COMPENSATION, OCS, LIABILITY, OIL INDUSTRY
0165 " INTERNATIONAL CONVENTIONS, ECONOMIC EFFECTS, AUSTRALIA, POLLUTION PREVENTION, OIL SPILLS
0212 " FISHERIES, COMPENSATION, LIABILITY, OCS, OIL-GAS LEASING, *OIL SPILL FUND
0248 " INTERNATIONAL AGREEMENTS, COASTAL ZONE MANAGEMENT, UN, OCEANS, REGULATIONS, POLLUTION CONTROL, *LAW OF THE SEA
0257 " ENVIRONMENTAL EFFECTS, CRUDE OIL, TRANS-ALASKA PIPELINE, OIL TRANSFER, OIL TERMINALS, OIL INDUSTRY, TANKERS, PIPELINES
0262 " BOOK REVIEW, WASTEWATER TREATMENT, POLLUTION CONTROL, REGULATIONS
0342 " ENVIRONMENTAL EFFECTS, CONTAMINATION, COMPENSATION, CHRONIC EFFECTS, LIABILITY, REGULATIONS, *CONFERENCE PANEL DISCUSSION
0089 LIABILITY, LEGISLATION, FISHERIES, CONTINGENCY PLANNING, COMPENSATION, OCS, OIL INDUSTRY
0090 " GOVERNMENT AGENCIES, EPA, REGULATIONS, US GOVERNMENT, *FWPCA, SPILL CLEANUP, OIL DISCHARGES
0091 " INTERNATIONAL CONVENTIONS, INTERNATIONAL AGREEMENTS, CONTINGENCY PLANNING, BASELINE STUDIES, UN, MONITORING, POLLUTION PREVENTION, POLLUTIONCONTROL, MEDITERRANEAN SEA, *MEDITERRANEAN ACTION PLAN, *UNEP
0102 " FISH, EQUIPMENT, CONTINGENCY PLANNING, CALIFORNIA, MONITORING, OIL SPILLS, POLLUTION CONTROL, SPILL CLEANUP, WILDLIFE, WATER QUALITY, *DEPARTMENT OF FISH AND GAME
0212 " LEGISLATION, FISHERIES, COMPENSATION, OCS, OIL-GAS LEASING, *OIL SPILL FUND
0253 " LAW ENFORCEMENT, CHROMATOGRAPHY, CHEMICAL ANALYSIS, BERMUDA, BALLAST , OIL SPILLS, OIL DISCHARGES, SHIPS, SOURCE IDENTIFICATION, *CASE STUDY, *LITIGATION
0338 " FUEL OIL, CONNECTICUT, SPILL CLEANUP, PIPELINES, USCG, *WEST HAVEN SPILL
0342 " LEGISLATION, ENVIRONMENTAL EFFECTS, CONTAMINATION, COMPENSATION, CHRONIC EFFECTS, REGULATIONS, *CONFERENCE PANEL DISCUSSION
0013 LOUISIANA, GULF OF MEXICO, DETECTION, REMOTE SENSING, NATURAL SEEPAGE, MARINE ENVIRONMENT, OCS, TEXAS
0024 " EQUIPMENT, DISTRIBUTION, DETECTION, DEEPWATER PORTS, CHEMICAL ANALYSIS, SAMPLING, *FLOUROMETRY, MONITORING, USCG
0302 " GASOLINE, TANKERS, SPILL CLEANUP, USCG, MISSISSIPPI RIVER, *BARGE GIM 106 SPILL
0310 " EQUIPMENT, TAR, SHIPS, SPILL CLEANUP, SORBENTS, MISSISSIPPI RIVER
0318 " SHIPS, SPILL CLEANUP, MISSISSIPPI RIVER, *IRENE S. LEMOS SPILL, SHIP COLLISION
0299 LUBRICATING OIL, ECONOMICS, CRANKCASE OIL, COST ANALYSIS, RECLAMATION, WASTE OIL, REFINING, RECYCLING
0013 MARINE ENVIRONMENT, LOUISIANA, GULF OF MEXICO, DETECTION, REMOTE SENSING, NATURAL SEEPAGE, OCS, TEXAS
0018 " CHEMICAL ANALYSIS, CANADA, SOURCE IDENTIFICATION, OIL SPILLS
0020 " CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, NATURAL SEEPAGE, OIL SPILLS, TAR, TANKERS, SANTA BARBARA CHANNEL, SOURCE IDENTIFICATION, SPECTROSCOPY
0032 " LEGISLATION, GUIDELINES, FOREIGN GOVERNMENTS, CHEMICAL ANALYSIS, CANADA, SURVEILLANCE, MONITORING, OIL DISCHARGES
0149 " INVERTEBRATES, HABITATS, CHRONIC EFFECTS, NATURAL SEEPAGE, SUBLETHAL EFFECTS, MARINE ORGANISMS, SANTA BARBARA CHANNEL

0171 MARINE ENVIRONMENT, FISH, CONTAMINATION, BIRDS, BIOLOGICAL EFFECTS, ARCTIC, MARINE ORGANISMS, OIL SPILLS, OFFSHORE DEVELOPMENT, REPRODUCTION, OCS, *REVIEW
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0175 " HARBORS, FUEL OIL, CALIFORNIA, BIOLOGICAL EFFECTS, BASELINE STUDIES, TANKERS, SANSINENA SPILL, PHYSICAL EFFECTS
0203 " CHEMICAL ANALYSIS, BOOK REVIEW, SEDIMENTS, OFFSHORE PRODUCTION
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0121 " BIOLOGICAL EFFECTS, MOLLUSKS, *CAROTENOIDS, METABOLISM
0125 " INVERTEBRATES, CONTAMINATION, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, BIODEGRADATION, BIBLIOGRAPHIES, BEHAVIOR, ANIMALS, TOXICITY, OIL SPILLS, PLANTS, VERTEBRATES, MICROORGANISMS
0132 " HYDROCARBONS , CRUSTACEANS, CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, NATURAL SEEPAGE, *EMERITA ANALOGA
0135 " FISH, DISPERSANTS, BIOLOGICAL EFFECTS, TOXICITY, MOLLUSKS, *CLAMS
0147 " INTERTIDAL ZONE, FATE, CRUDE OIL, BIOLOGICAL EFFECTS, BEACHES, ALASKA , SEDIMENTS, PHYSICAL EFFECTS, *TIDAL FLATS
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0098 " INTERNATIONAL CONVENTIONS, INTERNATIONAL AGREEMENTS, ENVIRONMENTAL MANAGEMENT, POLLUTION CONTROL, UN, *MEDITERRANEAN ACTION PLAN, *UNEP
0110 " HABITATS, ENVIRONMENTAL PROTECTION, ENVIRONMENTAL DETERIORATION, CONSERVATION, BIOLOGICAL EFFECTS, BALLAST , UN, RESOURCE MANAGEMENT, *ENDANGERED SPECIES, *UNEP, *IUCN
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0112 " HYDROCARBONS , FISHERIES, FISH, FATE, ECONOMIC EFFECTS, CONTAMINATION, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, BIOASSAY, AUSTRALIA, UPTAKE, *MUGIL CEPHALUS
0121 " MARINE ORGANISMS, BIOLOGICAL EFFECTS, MOLLUSKS, *CAROTENOIDS
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0184 " CRUDE OIL, BIODEGRADATION, BACTERIA, *CULTURE TECHNIQUES, *STANDARD, *HEXACHLOROETHANE
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0187 " HYDROCARBONS , BIODEGRADATION, ALGAE, *PROTOTHECA, *HYDROCARBON UTILIZATION
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0310 " LOUISIANA, EQUIPMENT, TAR, SHIPS, SPILL CLEANUP, SORBENTS
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0169 " ENVIRONMENTAL EFFECTS, CALIFORNIA, SOURCES, OIL SPILLS, OCS, SPILL TRAJECTORIES, *ANALYTICAL METHODOLOGY
0190 " ICE, FATE, BEHAVIOR, ARCTIC, ALASKA , OIL SLICKS, PRUDHOE BAY, OFFSHORE DEVELOPMENT, NOAA, *OCSEAP
0191 " FATE, DISPERSION, PREDICTION, NORTH SEA
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0193 " FATE, DRIFT, BEHAVIOR, MOVEMENT, OIL SLICKS, PREDICTION, STRAIT OF MAGELLAN
0194 " FATE, DISPERSION, COASTAL WATERS, ALASKA , MOVEMENT, OIL SPILLS, SPILL TRAJECTORIES, PREDICTIONS, *WIND FIELDS
0195 " OIL SLICKS, REMOTE SENSING, SPILL TRAJECTORIES, *LANDSAT DATA
0205 " COST ANALYSIS, OIL SPILLS, MOVEMENT, NORTH SEA, *COMPUTER SIMULATION
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0121 " METABOLISM, MARINE ORGANISMS, BIOLOGICAL EFFECTS, *CAROTENOIDS
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0136 " METABOLISM, HYDROCARBONS , CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, GLC, MARINE ORGNAISMS, UPTAKE, *N-ALKANES, *CRASSOSTREA GIGAS, *TAPES JAPONICA
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0004 " ICE, EQUIPMENT, CONTAMINATION, REMOTE SENSING, *TRACKING BUOYS
0005 " MOLLUSKS, HYDROCARBONS , COASTAL WATERS, CHEMICAL ANALYSIS, BIOINDICATORS, SAMPLING, *OYSTERS, *MUSSEL WATCH PROGRAM
0006 " LAW ENFORCEMENT, INTERNATIONAL AGREEMENTS, HYDROCARBONS , EQUIPMENT, BALLAST , TANKERS, OIL DISCHARGES, POLLUTION CONTROL
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0103 " BOOK REVIEW, ANALYTICAL TECHNIQUES, POLLUTION CONTROL, SOURCES
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0201 " INLAND, GROUNDWATER, ENVIRONMENTAL EFFECTS, DRILLING , PRODUCTION , US, *AQUIFERS, *SALT WATER INJECTION OPERATIONS

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0339 " EQUIPMENT, DESIGN-ENGINEERING, BOOMS, SPILL CLEANUP, SORBENTS, NORWAY
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0341 " EQUIPMENT, REFINERIES, *WASTE TREATMENT, POLLUTION CONTROL, *SOURCE CONTROL
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0106 " DISPERSANTS, BOOMS, BIRDS, SPILL CLEANUP, TANKERS, *SHETLAND ISLANDS, *ESSO BERNICA SPILL
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0120 " GROWTH, FUEL OIL, FISH, WSF, TOXICITY, SUBLETHAL EFFECTS, UPTAKE, RELEASE, *JET FUEL
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0309 " ENVIRONMENTAL EFFECTS, BOOMS, BIRDS, BEACHES, SPILL CONTAINMENT, SPILL CLEANUP, TANKERS, OIL TERMINALS, RELEASE, SCOTLAND
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0205 " MODELS, COST ANALYSIS, OIL SPILLS, NORTH SEA, *COMPUTER SIMULATION
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0315 " TANKERS, OIL SPILLS, OIL TRANSPORT, RIVERS, *CIBRO PHILADELPHIA SPILL
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0253 " LIABILITY, LAW ENFORCEMENT, CHROMATOGRAPHY, CHEMICAL ANALYSIS, BERMUDA, BALLAST , OIL SPILLS, SHIPS, SOURCE IDENTIFICATION, *CASE STUDY, *LITIGATION
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0214 OIL INDUSTRY, OIL-GAS LEASING, OFFSHORE DEVELOPMENT, OCS, GEORGES BANK, EIS, US GOVERNMENT, *LEASE SALE CANCELLATION

0217 " ALASKA , OIL TERMINALS, OIL TRANSPORT, PIPELINES, REGULATIONS, SOCIAL EFFECTS, *PUBLIC ACTION

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0238 " EUROPE, PIPELINES, OIL SPILLS, *CONCAWE

0257 " LEGISLATION, ENVIRONMENTAL EFFECTS, CRUDE OIL, TRANS-ALASKA PIPELINE, OIL TRANSFER, OIL TERMINALS, TANKERS, PIPELINES

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0052 " IRELAND, HARBORS, SPILL CLEANUP, SKIMMERS, SHIPS

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0079 " EQUIPMENT, BOOK REVIEW, SPILL CLEANUP

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0259 " ADSORPTION, WASTEWATERS, SORBENTS, PATENT

0275 " ADSORPTION, WASTEWATER TREATMENT, SORBENTS, OIL-WATER SEPARATION, PATENT

0279 " EQUIPMENT, WASTEWATER TREATMENT, SKIMMERS, PRODUCT INFORMATION

0285 " OIL DISCHARGES, WASTEWATER TREATMENT, WASTE OIL

0298 " ABSORPTION, OIL-WATER SEPARATION, WASTEWATERS, SORBENTS, PATENT

0220 OIL SHALE, OIL INDUSTRY, *ACCIDENTS, *ENERGY SYSTEMS

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0041 " COALESCENCE, SPILL CONTAINMENT, SPILL CLEANUP, PATENT

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0059 " OIL SPILLS, SPILL CLEANUP

0060 " OIL REMOVAL, OIL DISCHARGES, BIODEGRADATION, BALLAST , BACTERIA, SPILL CLEANUP, PRODUCT INFORMATION, WASTEWATERS

0061 " EQUIPMENT, SPILL CLEANUP, OIL-WATER SEPARATION, PATENT

0071 " EQUIPMENT, ENVIRONMENTAL EFFECTS, DISPERSANTS, CONTINGENCY PLANNING, CALIFORNIA, API, SPILL CONTAINMENT, SPILL REMOVAL, SKIMMERS, PERSONNEL TRAINING, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION

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0193 " MOVEMENT, MODELS, FATE, DRIFT, BEHAVIOR, PREDICTION, STRAIT OF MAGELLAN

0195 " MODELS, REMOTE SENSING, SPILL TRAJECTORIES, *LANDSAT DATA

0301 " EQUIPMENT, OIL TRANSFER, TANKERS, SPILL CLEANUP, SHORELINES, OIL SPILLS, *ANDROS PATRIA SPILL

0321 " DISPERSANTS, CRUDE OIL, OIL SPILLS, TANKERS, SPREADING, SPILL CLEANUP, SPAIN, *ANDROS PATRIA SPILL

R004 " MODELS, CONTINGENCY PLANNING, SPILL CONTAINMENT, SPILL CLEANUP

R009 " EMULSIONS, DISPERSION, CHEMICAL EFFECTS, PHYSICAL EFFECTS, *WAVE ACTION

0018 OIL SPILLS, MARINE ENVIRONMENT, CHEMICAL ANALYSIS, CANADA, SOURCE IDENTIFICATION

0020 " NATURAL SEEPAGE, MARINE ENVIRONMENT, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, TAR, TANKERS, SANTA BARBARA CHANNEL, SOURCE IDENTIFICATION, SPECTROSCOPY

0029 " ANALYTICAL TECHNIQUES, SAMPLING, SPECTROSCOPY, SOURCE IDENTIFICATION

0035 " ANALYTICAL TECHNIQUES, SOURCE IDENTIFICATION, WEATHERING, SPECTROSCOPY, *IR, *DATA BASE

0044 " EPA, API, *FIELD TESTS, *CHEMICAL TREATMENT AGENTS

0059 " OIL SLICKS, SPILL CLEANUP

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0088 " MARSHES, ENVIRONMENTAL EFFECTS, CORAL REEFS, CONTINGENCY PLANNING, COASTS, COASTAL ZONE MANAGEMENT, BEACHES, SHORELINES, SPILL CLEANUP, *COASTAL VULNERABILITY INDEX

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0125 " MICROORGANISMS, MARINE ORGANISMS, INVERTEBRATES, CONTAMINATION, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, BIODEGRADATION, BIBLIOGRAPHIES, BEHAVIOR, ANIMALS, TOXICITY, PLANTS, VERTEBRATES

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0144 " FATE, CHRONIC EFFECTS, BIODEGRADATION, BACTERIA, SPILL CLEANUP, MICROORGANISM, SOURCES, *PETROPHILES

0146 " OFFSHORE DEVELOPMENT, FATE, ENVIRONMENTAL EFFECTS, DISPERSION, DECOMPOSITION, CONTINGENCY PLANNING, ALASKA , PREDICTION, SHORELINES, *COOK INLET

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0152 OIL SPILLS, OFFSHORE DEVELOPMENT, HABITATS, ENVIRONMENTAL EFFECTS, CONSERVATION, BIRDS, BASELINE STUDIES, ALASKA , WILDLIFE, RESOURCE MANAGEMENT, *ANSER CANAGICUS

0165 " LEGISLATION, INTERNATIONAL CONVENTIONS, ECONOMIC EFFECTS, AUSTRALIA, POLLUTION PREVENTION

0169 " OCS, MODELS, ENVIRONMENTAL EFFECTS, CALIFORNIA, SOURCES, SPILL TRAJECTORIES, *ANALYTICAL METHODOLOGY

0171 " OFFSHORE DEVELOPMENT, OCS, MARINE ORGANISMS, MARINE ENVIRONMENT, FISH, CONTAMINATION, BIRDS, BIOLOGICAL EFFECTS, ARCTIC, REPRODUCTION, *REVIEW

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0234 " INFORMATION SYSTEMS, TANKERS, *1942-1978 SPILLS, STATISTICAL ANALYSIS, *WORLDWIDE SPILL REPORTING NEEDS

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0301 " OIL SLICKS, EQUIPMENT, OIL TRANSFER, TANKERS, SPILL CLEANUP, SHORELINES, *ANDROS PATRIA SPILL

0303 " SPILL CLEANUP, OIL TERMINALS, PORTS , SHORELINES, SPILL CONTAINMENT, SCOTLAND, *ESSO BERNICIA SPILL

0305 " NEW YORK, FUEL OIL, OIL TRANSFER, SHIPS, *CIBRO PHILADELPHIA SPILL

0307 " ICE, FUEL OIL, PIPELINES, SPILL CLEANUP, STREAMS, RESHWATER, *INDIANA

0312 " NOAA, FUEL OIL, ALASKA , SHIPS, USCG, USN, *GLACIER QUEEN FERRY SPILL

0313 " IRELAND, CRUDE OIL, TANKERS, OIL TERMINALS, PORTS , SPILL CLEANUP, SHORELINES, *BETELGEUSE SPILL

0314 " FUEL OIL, BAYS, PUERTO RICO

0315 " NEW YORK, TANKERS, OIL TRANSPORT, RIVERS, *CIBRO PHILADELPHIA SPILL

0316 " FUEL OIL, CORAL REEFS, BERMUDA, TANKERS, OIL TRANSFER, *MARI BOEING SPILL

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0322 " EQUIPMENT, CRUDE OIL, TANKERS, OIL TRANSFER, SHORELINES, SPILL CLEANUP, SPAIN, *ANDROS PATRIA SPILL

0323 " PIPELINES, PETROLEUM PRODUCTS, *COLOMBIA, *PIPELINE EXPLOSION

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0325 " CRUDE OIL, SPILL CLEANUP, TANKERS, TEXAS, *ESSO BAYWAY SPILL

0326 " LEAKAGE, FUEL OIL, SHIPS, TANKERS, SINGAPORE, SHIP COLLISION

0327 " NEW YORK, GASOLINE, EVAPORATION, TANKERS, *BARGE ROBERT L. POLING SPILL

0328 " ICE, FUEL OIL, CANADA, ARCTIC, SHIPS, *UNDER-ICE SPILL, *ICE BREAKER

0329 " ICE, FUEL OIL, CANADA, ARCTIC, *AMUNDSEN GULF

0330 " JAPAN, FUEL OIL, ENVIRONMENTAL EFFECTS, ECONOMIC EFFECTS, SHIPS, SPILL CLEANUP, *JUPITER GAS SPILL

0331 " LEAKAGE, FUEL OIL, CARIBBEAN SEA, SHIPS, *MASTER MICHAEL SPILL

0332 " IRELAND, DISPERSANTS,TANKERS, SPILL CLEANUP, *BANTRY BAY, *BETELGEUSE SPILL

0334 " CONTAMINATION, BEACHES, OIL TANKERS, PUERTO RICO, REFINERIES

0336 " MORTALITY, ICE, FUEL OIL, DENMARK, BIRDS, TANKERS, SHORELINES, *THUNTANK 3 SPILL

0337 " HARBORS, FUEL OIL, BEACHES, SHIPS, SCOTLAND

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R003 " MONITORING, EQUIPMENT, DETECTION, REMOTE SENSING, *SPILL RESPONSE

R008 " MODELS, HYDROCARBONS , ENVIRONMENTAL EFFECTS, BASELINE STUDIES, SPILL TRAJECTORIES, PUGET SOUND, STRAIT OF MAGELLAN

0084 OIL TERMINALS, ESTUARIES, CRUDE OIL, CONTINGENCY PLANNING. UK, SPILL CLEANUP, *AMLWCH SPILL

0161 " NORTH SEA, ENVIRONMENTAL EFFECTS, DEVELOPMENT , ONSHORE IMPACTS, POLLUTION PREVENTION, *SHETLAND

0217 " OIL INDUSTRY, ALASKA , OIL TRANSPORT, PIPELINES, REGULATIONS, SOCIAL EFFECTS, *PUBLIC ACTION

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0257 " OIL INDUSTRY, LEGISLATION, ENVIRONMENTAL EFFECTS, CRUDE OIL, TRANS-ALASKA PIPELINE, OIL TRANSFER, TANKERS, PIPELINES

0303 " OIL SPILLS, SPILL CLEANUP, PORTS , SHORELINES, SPILL CONTAINMENT, SCOTLAND, *ESSO BERNICIA SPILL

0309 " MORTALITY, ENVIRONMENTAL EFFECTS, BOOMS, BIRDS, BEACHES, SPILL CONTAINMENT, SPILL CLEANUP, TANKERS, RELEASE, SCOTLAND

0313 OIL TERMINALS, OIL SPILLS, IRELAND, CRUDE OIL, TANKERS, PORTS , SPILL CLEANUP, SHORELINES, *BETELGEUSE SPILL
0096 OIL TRANSFER, SPILL CLEANUP, PERSONNEL TRAINING, SAN FRANCISCO BAY, POLLUTION PREVENTION, *OIL SPILL RESPONSE
0241 " GULF OF MEXICO, DEEPWATER PORTS, OFFSHORE TERMINALS, TANKERS, TEXAS, POLLUTION PREVENTION
0242 " NORWAY, INTERNATIONAL AGREEMENTS, DEEPWATER PORTS, OIL TRANSPORT, PIPELINES, TANKERS, US, *LOOP
0255 " OIL TERMINALS, CONTINGENCY PLANNING, COASTAL WATERS, CANADA, PORTS , TANKERS, SAFETY, POLLUTION PREVENTION, *BRITISH COLUMBIA
0257 " OIL TERMINALS, OIL INDUSTRY, LEGISLATION, ENVIRONMENTAL EFFECTS, CRUDE OIL, TRANS-ALASKA PIPELINE, TANKERS, PIPELINES
0301 " OIL SPILLS, OIL SLICKS, EQUIPMENT, TANKERS, SPILL CLEANUP, SHORELINES, *ANDROS PATRIA SPILL
0305 " OIL SPILLS, NEW YORK, FUEL OIL, SHIPS, *CIBRO PHILADELPHIA SPILL
0316 " OIL SPILLS, FUEL OIL, CORAL REEFS, BERMUDA, TANKERS, *MARI BOEING SPILL
0322 " OIL SPILLS, EQUIPMENT, CRUDE OIL, TANKERS, SHORELINES, SPILL CLEANUP, SPAIN, *ANDROS PATRIA SPILL
0197 OIL TRANSPORT, OIL DISCHARGES, OFFSHORE PRODUCTION, NATURAL SEEPAGE, FATE, BIODEGRADATION, PETROLEUM PRODUCTS
0209 " OIL INDUSTRY, ICE, FOREIGN GOVERNMENTS, EXPLORATION , ENVIRONMENTAL EFFECTS, ECONOMICS, DEVELOPMENT , CANADA, BEAUFORT SEA, ARCTIC, SOCIOECONOMIC EFFECTS, TANKERS
0217 " OIL TERMINALS, OIL INDUSTRY, ALASKA , PIPELINES, REGULATIONS, SOCIAL EFFECTS, *PUBLIC ACTION
0231 " OIL SPILLS, AMOCO CADIZ SPILL, TANKERS, STATISTICS
0232 " OIL SPILLS, TANKERS, STATISTICS, *ANNUAL DATA
0235 " TANKERS, SHIPS, POLLUTION PREVENTION, REGULATIONS, SAFETY
0239 " OIL DISCHARGES, LEAKAGE, PIPELINES
0242 " OIL TRANSFER, NORWAY, INTERNATIONAL AGREEMENTS, DEEPWATER PORTS, PIPELINES, TANKERS, US, *LOOP
0245 " INTERNATIONAL CONVENTIONS, IMCO, CRUDE OIL WASHING, TANKERS, SHIPS, SAFETY, POLLUTION PREVENTION, SEGREGATED BALLAST
0315 " OIL SPILLS, NEW YORK, TANKERS, RIVERS, *CIBRO PHILADELPHIA SPILL
0021 OIL-WATER SEPARATION, EQUIPMENT, ANALYTICAL TECHNIQUES, SAMPLING, *QUANTITATIVE FIELD METHOD
0061 " OIL SLICKS, EQUIPMENT, SPILL CLEANUP, PATENT
0263 " FILTRATION, EQUIPMENT, EMULSIONS, COALESCENCE, WASTEWATER TREATMENT, PRODUCT INFORMATION
0268 " MEDITERRANEAN SEA, EQUIPMENT, DISPOSAL , BALLAST , TANKERS, WASTEWATER TREATMENT
0275 " OIL REMOVAL, ADSORPTION, WASTEWATER TREATMENT, SORBENTS, PATENT
0276 " FLOCCULATION, WASTEWATER TREATMENT, PATENT
0284 " DISPERSANTS, WASTEWATER TREATMENT, SURFACTANTS, *MAGNETIC SEPARATION, PATENT
0286 " BALLAST , PRODUCT INFORMATION, *BARGE
0287 " ISRAEL, INDUSTRIES, ULTRAFILTRATION, WASTEWATERS
0288 " OFFSHORE PRODUCTION, MONITORING, EQUIPMENT, PLATFORMS, STORAGE, *PARALLEL PLATE SEPARATORS, *GAS FLOTATION
0289 " FILTRATION, EQUIPMENT, COALESCENCE, PRODUCT INFORMATION
0290 " DESIGN-ENGINEERING, WASTEWATER TREATMENT, POLLUTION CONTROL, PATENT, *FLUIDIZED BEDS
0291 " GRAVITY SEPARATION, EQUIPMENT, PRODUCT INFORMATION
0292 " HYDROCARBONS , WASTEWATERS, PRODUCT INFORMATION
0293 " EQUIPMENT, DESIGN-ENGINEERING, WASTEWATER TREATMENT, USN
0294 " EQUIPMENT, DESIGN-ENGINEERING, WASTEWATER TREATMENT, PATENT
0295 " EMULSIONS, WASTEWATERS, SURFACTANTS, PATENT, *OZONATION
0296 " EQUIPMENT, PRODUCT INFORMATION
0297 " EQUIPMENT, PRODUCT INFORMATION
0298 " OIL REMOVAL, ABSORPTION, WASTEWATERS, SORBENTS, PATENT
0140 ONSHORE IMPACTS, OIL SPILLS, FATE, ENVIRONMENTAL EFFECTS, DISTRIBUTION, BEACHES, SEDIMENTATION, SHORELINES, URQUIOLA SPILL
0161 " OIL TERMINALS, NORTH SEA, ENVIRONMENTAL EFFECTS, DEVELOPMENT , POLLUTION PREVENTION, *SHETLAND
0216 " OFFSHORE DRILLING, OFFSHORE DEVELOPMENT, COASTAL ZONE MANAGEMENT, REGULATIONS, *PLANNING
0222 " OFFSHORE DEVELOPMENT, NORTH SEA, ENVIRONMENTAL EFFECTS, BIBLIOGRAPHIES, UK, *SCOTLAND LIBRARIES
0047 OREGON, EQUIPMENT, SPILL CLEANUP, SPILL CONTAINMENT, RIVERS, POLLUTION CONTROL, *CLEANUP SERVICE
0270 OXIDATION, WASTEWATER TREATMENT, PETROLEUM PRODUCTS, *OZONATION
0027 PACIFIC OCEAN, MEDITERRANEAN SEA, INDIAN OCEAN, HYDROCARBONS , CONCENTRATIONS, BALTIC SEA, ANALYTICAL TECHNIQUES, SEAWATER, SPECTROSCOPY, *SEA OF JAPAN , *SEA OF OKHOTSK
0155 " OCS, ENVIRONMENTAL EFFECTS, CALIFORNIA, BLM, BASELINE STUDIES
0160 " OFFSHORE DEVELOPMENT, OCS, CALIFORNIA, BLM, BASELINE STUDIES, *CULTURAL RESOURCES, *SOUTHERN CALIFORNIA BIGHT

0007	PAH, INDUSTRIES, GC/MS, DETECTION, AROMATIC HYDROCARBONS, ANALYTICAL TECHNIQUES, WASTEWATERS
0026	" CHEMICAL ANALYSIS, ANALYTICAL TECHNIQUES, *FLUOROMETRY, *PARTITION COEFFICIENTS, *NAPHTHALENE HOMOLOGUES
0129	" METABOLISM, FISH, CHROMATOGRAPHY, CARCINOGENS, BIOLOGICAL EFFECTS, BIODEGRADATION, AROMATIC HYDROCARBONS, AQUATIC ENVIRONMENT
0134	" METABOLISM, HYDROCARBONS , FISH, BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, *HEPATIC MICROSOMAL ENZYMES, *SALMO GAIRDNERI
0180	" MICROORGANISMS, HYDROCARBONS , FRESHWATER, CONTAMINATION, BIODEGRADATION, AROMATIC HYDROCARBONS, SEDIMENTS, *TRANSFORMATION RATES
0198	" OCEANS, HYDROCARBONS , GC/MS, DISTRIBUTION, AROMATIC HYDROCARBONS, SOURCES
R007	" INVERTEBRATES, HYDROCARBONS , FISH, UPTAKE, TOXICITY, SUBLETHAL EFFECTS, GROWTHH, RESPIRATION, *HISTOLOGY, *AUTORADIOGRAPHY
0041	PATENT, OIL SLICKS, COALESCENCE, SPILL CONTAINMENT, SPILL CLEANUP
0042	" EQUIPMENT, DESIGN-ENGINEERING, BOOMS, SPILL CONTAINMENT
0043	" DESIGN-ENGINEERING, BOOMS, SPILL CONTAINMENT, *CONNECTOR ASSEMBLY
0048	" EQUIPMENT, DESIGN-ENGINEERING, SPILL CLEANUP, SURFACTANTS
0057	" EQUIPMENT, SPILL CLEANUP, SPILL REMOVAL
0061	" OIL-WATER SEPARATION, OIL SLICKS, EQUIPMENT, SPILL CLEANUP
0076	" ADSORPTION, SPILL CLEANUP, SPILL REMOVAL, *SAWDUST, *PARAFFIN
0077	" ADSORPTION, SPILL CLEANUP, SPILL REMOVAL, *CLOTH, *PARAFFIN
0078	" SPILL CLEANUP, SPILL REMOVAL, *SAWDUST. *PARAFFIN
0081	" BEACH CLEANUP, SPILL REMOVAL, *CRYOGENIC BEACH CLEANER
0259	" OIL REMOVAL, ADSORPTION, WASTEWATERS, SORBENTS
0260	" ADSORPTION, WASTEWATER TREATMENT, SORBENTS, WASTEWATERS
0267	" EMULSIFIERS, *DETERGENTS
0275	" OIL-WATER SEPARATION, OIL REMOVAL, ADSORPTION, WASTEWATER TREATMENT, SORBENTS
0276	" OIL-WATER SEPARATION, FLOCCULATION, WASTEWATER TREATMENT
0283	" ABSORPTION, WASTEWATER TREATMENT, SORBENTS, *POLYURETHANE FOAM
0284	" OIL-WATER SEPARATION, DISPERSANTS, WASTEWATER TREATMENT, SURFACTANTS, *MAGNETIC SEPARATION
0290	" OIL-WATER SEPARATION, DESIGN-ENGINEERING, WASTEWATER TREATMENT, POLLUTION CONTROL, *FLUIDIZED BEDS
0294	" OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, WASTEWATER TREATMENT
0295	" OIL-WATER SEPARATION, EMULSIONS, WASTEWATERS, SURFACTANTS, *OZONATION
0298	" OIL-WATER SEPARATION, OIL REMOVAL, ABSORPTION, WASTEWATERS, SORBENTS
0071	PERSONNEL TRAINING, OIL SLICKS, EQUIPMENT, ENVIRONMENTAL EFFECTS, DISPERSANTS, CONTINGENCY PLANNING, CALIFORNIA, API, SPILL CONTAINMENT, SPILL REMOVAL, SKIMMERS, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0082	" OFFSHORE DRILLING, OCS, EQUIPMENT, BLOWOUT PREVENTION, REGULATIONS, USGS, SAFETY, POLLUTION PREVENTION, PLATFORMS, *STANDARDS
0083	" OFFSHORE DRILLING, GUIDELINES, BLOWOUT PREVENTION, USGS, POLLUTION PREVENTION, REGULATIONS, *WELL-CONTROL TRAINING
0096	" OIL TRANSFER, SPILL CLEANUP, SAN FRANCISCO BAY, POLLUTION PREVENTION, *OIL SPILL RESPONSE
0233	" INTERNATIONAL AGREEMENTS, TANKERS, SAFETY, POLLUTION PREVENTION, US GOVERNMENT
0138	PETROCHEMICALS, GROUNDWATER, CONTAMINATION, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, POLLUTION PREVENTION
0207	" INDUSTRIES, EUROPE, ECONOMICS, WASTEWATER TREATMENT
0251	" LEAKAGE, GUIDELINES, GROUNDWATER, CONTAMINATION, CANADA, STORAGE
0271	" BIOLOGICAL EFFECTS, WASTEWATERS, TOXICITY, AQUATIC ENVIRONMENTS, *AQUATIC ORGANISMS
0274	" BOOK REVIEW, WASTEWATER TREATMENT, POLLUTION CONTROL, *PROCEEDINGS
0277	" INDUSTRIES, BIODEGRADATION, BACTERIA, WASTEWATERS, TOXICITY, *METHANE FERMENTATION, *ANAEROBIC DIGESTION
0036	PETROLEUM PRODUCTS, LEAKAGE, FUEL OIL, DETECTION, CONTAMINATION, SOURCE IDENTIFICATION, STORAGE, *TAGGING
0070	" OIL REMOVAL, LAKES , EQUIPMENT, SPILL CLEANUP, *LAKE MARACAIBO
0123	" GROWTH, BIOLOGICAL EFFECTS, ALGAE, TOXICITY, *PHOTOSYNTHESIS, *BLUE-GREEN ALGAE
0131	" METABOLISM, HYDROCARBONS , BIOLOGICAL EFFECTS, BIOASSAY, ACUTE EFFECTS, TOXICITY, SOLVENTS, *ALKALINE PHOSPHATASE, *LIPID PEROXIDATION
0197	" OIL TRANSPORT, OIL DISCHARGES, OFFSHORE PRODUCTION, NATURAL SEEPAGE, FATE, BIODEGRADATION
0270	" OXIDATION, WASTEWATER TREATMENT, *OZONATION
0323	" OIL SPILLS, PIPELINES, *COLOMBIA, *PIPELINE EXPLOSION
R001	" HYDROCARBONS , DETECTION, BIOINDICATORS, BIOASSAY, ALGAE, TOXICITY
0034	PHYSICAL EFFECTS, ANALYTICAL TECHNIQUES, SOURCE IDENTIFICATION, WEATHERING, SPECTROSCOPY, *IR, *SIMULATION
0141	" NATURAL SEEPAGE, HYDROCARBONS , DISTRIBUTION, SANTA BARBARA CHANNEL, *SALINITY
0147	" MARINE ORGANISMS, INTERTIDAL ZONE, FATE, CRUDE OIL, BIOLOGICAL EFFECTS, BEACHES, ALASKA , SEDIMENTS, *TIDAL FLATS
0175	" MARINE ENVIRONMENT, HARBORS, FUEL OIL, CALIFORNIA, BIOLOGICAL EFFECTS, BASELINE STUDIES, TANKERS, SANSINENA SPILL
0221	" MARINE ORGANISMS, DRILLING , DISTRIBUTION, BIOLOGICAL EFFECTS, BIOASSAY, ALASKA , SAMPLING
R009	" OIL SLICKS, EMULSIONS, DISPERSION, CHEMICAL EFFECTS, *WAVE ACTION

0028 PHYTOPLANKTON, MORTALITY, DISPERSANTS, BIOASSAY, ALGAE, TOXICITY, *POPULATION GROWTH RATES, *CHLAMYDOMONAS, *COREXIT 9527
0119 " MORTALITY, GROWTH, CRUDE OIL, BIOLOGICAL EFFECTS, ARCTIC, SUBLETHAL EFFECTS, *DIATOMS
0172 PIPELINES, OIL SPILLS, OFFSHORE DEVELOPMENT, ENVIRONMENTAL EFFECTS
0217 " OIL TRANSPORT, OIL TERMINALS, OIL INDUSTRY, ALASKA , REGULATIONS, SOCIAL EFFECTS, *PUBLIC ACTION
0229 " OIL SPILLS, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, DEVELOPMENT , BASELINE STUDIES, *CONFERENCE
0236 " ENVIRONMENTAL PROTECTION, ECONOMICS, COASTAL WATERS, CANADA, US, TANKERS, *BRITISH COLUMBIA, *KITIMAT PIPELINE
0237 " LAND FARMING, ILLINOIS, CRUDE OIL, SPILL CLEANUP, SPILL CONTAINMENT, SPILL REMOVAL
0238 " OIL SPILLS, OIL INDUSTRY, EUROPE, *CONCAWE
0239 " OIL TRANSPORT, OIL DISCHARGES, LEAKAGE
0240 " MONITORING, LEAKAGE, EQUIPMENT, DETECTION, DESIGN-ENGINEERING, PRODUCT INFORMATION
0242 " OIL TRANSPORT, OIL TRANSFER, NORWAY, INTERNATIONAL AGREEMENTS, DEEPWATER PORTS, TANKERS, US, *LOOP
0257 " OIL TRANSFER, OIL TERMINALS, OIL INDUSTRY, LEGISLATION, ENVIRONMENTAL EFFECTS, CRUDE OIL, TRANS-ALASKA PIPELINE, TANKERS
0307 " OIL SPILLS, ICE, FUEL OIL, SPILL CLEANUP, STREAMS, RESHWATER, *INDIANA
0308 " ILLINOIS, SPILL CLEANUP, RIVERS
0311 " CRUDE OIL, SPILL CLEANUP, *CLEANUP COSTS, *UTAH, *FARMINGTON BAY SPILL
0323 " PETROLEUM PRODUCTS, OIL SPILLS, *COLOMBIA, *PIPELINE EXPLOSION
0338 " LIABILITY, FUEL OIL, CONNECTICUT, SPILL CLEANUP, USCG, *WEST HAVEN SPILL
R005 " HABITATS, FOOD WEB, ENVIRONMENTAL EFFECTS, DEVELOPMENT , BIOLOGICAL EFFECTS, ARCTIC, MAMMALS
0111 PLANKTON, HYDROCARBONS , FOOD WEB, EKOFISK BLOWOUT, CRUSTACEANS, CRUDE OIL, BIOLOGICAL EFFECTS, WSF, *ZOEAL LARVAE, *HYAS ARANEUS
0125 PLANTS, OIL SPILLS, MICROORGANISMS, MARINE ORGANISMS, INVERTEBRATES, CONTAMINATION, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, BIODEGRADATION, BIBLIOGRAPHIES, BEHAVIOR, ANIMALS, TOXICITY, VERTEBRATES
0082 PLATFORMS, PERSONNEL TRAINING, OFFSHORE DRILLING, OCS, EQUIPMENT, BLOWOUT PREVENTION, REGULATIONS, USGS, SAFETY, POLLUTION PREVENTION, *STANDARDS
0094 " NATURAL SEEPAGE, LEAKAGE, EQUIPMENT, BLOWOUTS, SANTA BARBARA CHANNEL, SPILL CONTAINMENT, *SUBMERGED TENTS
0142 " OIL DISCHARGES, OFFSHORE PRODUCTION, HYDROCARBONS , GULF OF MEXICO, ENVIRONMENTAL EFFECTS, DETECTION, BASELINE STUDIES, *ALKANES
0189 " HYDROCARBONS , FISH, FATE, DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA, SAMPLING, SANTA BARBARA CHANNEL
0199 " OIL FIELDS, GULF OF MEXICO, BIOMASS, SAMPLING, DISTRIBUTIONS, WASTEWATERS, *BIOFOULING
0288 " OIL-WATER SEPARATION, OFFSHORE PRODUCTION, MONITORING, EQUIPMENT, STORAGE, *PARALLEL PLATE SEPARATORS, *GAS FLOTATION
0006 POLLUTION CONTROL, OIL DISCHARGES, MONITORING, LAW ENFORCEMENT, INTERNATIONAL AGREEMENTS, HYDROCARBONS , EQUIPMENT, BALLAST , TANKERS
0047 " OREGON, EQUIPMENT, SPILL CLEANUP, SPILL CONTAINMENT, RIVERS, *CLEANUP SERVICE
0068 " EQUIPMENT, SKIMMERS, PRODUCT INFORMATION, SPILL REMOVAL
0080 " SPILL CLEANUP
0087 " OIL SPILLS, GOVERNMENT AGENCIES, CONTINGENCY PLANNING, AMOCO CADIZ SPILL, TORREY CANYON SPILL, SPILL CLEANUP
0093 " EQUIPMENT, BOOMS, POLLUTION PREVENTION, SPILL CLEANUP, SORBENTS, SPILL CONTAINMENT, *UNDERWATER CANOPY, PRODUCT INFORMATION
0098 " MEDITERRANEAN SEA, INTERNATIONAL CONVENTIONS, INTERNATIONAL AGREEMENTS, ENVIRONMENTAL MANAGEMENT, UN, *MEDITERRANEAN ACTION PLAN, *UNEP
0101 " NORTH SEA, SHIPS, SAFETY, *EMERGENCY RESPONSE VESSELS
0102 " OIL SPILLS, MONITORING, LIABILITY, FISH, EQUIPMENT, CONTINGENCY PLANNING, CALIFORNIA, SPILL CLEANUP, WILDLIFE, WATER QUALITY, *DEPARTMENT OF FISH AND GAME
0103 " MONITORING, BOOK REVIEW, ANALYTICAL TECHNIQUES, SOURCES
0162 " OIL DISCHARGES, INCINERATION, FATE, BEHAVIOR, ARCTIC, SPILL CLEANUP, SUBARCTIC REGIONS, *EXPERIMENTAL SPILLS
0167 " EUROPE, WASTEWATERS, WASTEWATER TREATMENT, REFINERIES, *CONCAWE
0170 " OIL REMOVAL, CONTAMINANTS, CHEMICAL ANLYSIS
0176 " OIL SPILLS, MICROORGANISMS, BOOK REVIEW, BIODEGRADATION
0181 " MICROORGANISMS, BOOK REVIEW, BIOLOGICAL EFFECTS, BIODEGRADATION
0206 " OIL INDUSTRY, EXPLORATION , ENVIRONMENTAL PROTECTION, ECONOMICS, PRODUCTION , REFINING
0208 " FATE, ENVIRONMENTAL PROTECTION, ENVIRONMENTAL EFFECTS, ECONOMICS, COST ANALYSIS, API, REFINERIES, POLLUTION PREVENTION
0226 " COST ANALYSIS, BOOK REVIEW, REFINERIES, WASTEWATERS, SOCIOECONOMIC EFFECTS, POLLUTION PREVENTION
0248 " OCEANS, LEGISLATION, INTERNATIONAL AGREEMENTS, COASTAL ZONE MANAGEMENT, UN, REGULATIONS, *LAW OF THE SEA
0252 " INTERNATIONAL CONVENTIONS, INTERNATIONAL AGREEMENTS, IMCO, CRUDE OIL WASHING, TANKERS, SAFETY, SEGREGATED BALLAST

0258 POLLUTION CONTROL, COST ANALYSIS, CHEMICAL ANALYSIS, BIBLIOGRAPHIES, REFINING, WASTEWATER TREATMENT, SLUDGE , SAMPLING
0262 " LEGISLATION, BOOK REVIEW, WASTEWATER TREATMENT, REGULATIONS
0274 " PETROCHEMICALS, BOOK REVIEW, WASTEWATER TREATMENT, *PROCEEDINGS
0290 " PATENT, OIL-WATER SEPARATION, DESIGN-ENGINEERING, WASTEWATER TREATMENT, *FLUIDIZED BEDS
0341 " MONITORING, EQUIPMENT, REFINERIES, *WASTE TREATMENT, *SOURCE CONTROL
0082 POLLUTION PREVENTION, PLATFORMS, PERSONNEL TRAINING, OFFSHORE DRILLING, OCS, EQUIPMENT, BLOWOUT PREVENTION, REGULATIONS, USGS, SAFETY, *STANDARDS
0083 " PERSONNEL TRAINING, OFFSHORE DRILLING, GUIDELINES, BLOWOUT PREVENTION, USGS, REGULATIONS, *WELL-CONTROL TRAINING
0091 " MONITORING, MEDITERRANEAN SEA, LIABILITY, INTERNATIONAL CONVENTIONS, INTERNATIONAL AGREEMENTS, CONTINGENCY PLANNING, BASELINE STUDIES, UN, POLLUTIONCONTROL, *MEDITERRANEAN ACTION PLAN, *UNEP
0092 " MEDITERRANEAN SEA, LAW ENFORCEMENT, FOREIGN GOVERNMENTS, INTERATIONAL AGREEMENTS
0093 " POLLUTION CONTROL, EQUIPMENT, BOOMS, SPILL CLEANUP, SORBENTS, SPILL CONTAINMENT, *UNDERWATER CANOPY, PRODUCT INFORMATION
0095 " EQUIPMENT, PRODUCT INFORMATION, *OIL STOP VALVE
0096 " PERSONNEL TRAINING, OIL TRANSFER, SPILL CLEANUP, SAN FRANCISCO BAY, *OIL SPILL RESPONSE
0097 " LAKES , INLAND, GROUNDWATER, RIVERS, PRODUCT INFORMATION, *IMPERVIOUS UNDERGROUND BARRIER
0099 " EMULSIFIERS, DISPERSANTS, SPILL CLEANUP, PRODUCT INFORMATION
0138 " PETROCHEMICALS, GROUNDWATER, CONTAMINATION, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES
0161 " ONSHORE IMPACTS, OIL TERMINALS, NORTH SEA, ENVIRONMENTAL EFFECTS, DEVELOPMENT , *SHETLAND
0165 " OIL SPILLS, LEGISLATION, INTERNATIONAL CONVENTIONS, ECONOMIC EFFECTS, AUSTRALIA
0202 " INLAND, GROUNDWATER, ENVIRONMENTAL PROTECTION, DRILLING , *AQUIFERS
0208 " POLLUTION CONTROL, FATE, ENVIRONMENTAL PROTECTION, ENVIRONMENTAL EFFECTS, ECONOMICS, COST ANALYSIS, API, REFINERIES
0226 " POLLUTION CONTROL, COST ANALYSIS, BOOK REVIEW, REFINERIES, WASTEWATERS, SOCIOECONOMIC EFFECTS
0233 " PERSONNEL TRAINING, INTERNATIONAL AGREEMENTS, TANKERS, SAFETY, US GOVERNMENT
0235 " OIL TRANSPORT, TANKERS, SHIPS, REGULATIONS, SAFETY
0241 " OIL TRANSFER, GULF OF MEXICO, DEEPWATER PORTS, OFFSHORE TERMINALS, TANKERS, TEXAS
0243 " BALLAST , STORAGE, *UNDERWATER TANKS, DESIGN-ENGINEEERING
0244 " OIL DISCHARGES, IMCO, BALLAST , TANKERS, SHIPS, INTERNATIONAL CONVENTION
0245 " OIL TRANSPORT, INTERNATIONAL CONVENTIONS, IMCO, CRUDE OIL WASHING, TANKERS, SHIPS, SAFETY, SEGREGATED BALLAST
0249 " INTERNATIONAL CONVENTIONS, UN, SAFETY, REGULATIONS, SHIPS, *LAW OF THE SEA
0255 " OIL TRANSFER, OIL TERMINALS, CONTINGENCY PLANNING, COASTAL WATERS, CANADA, PORTS , TANKERS, SAFETY, *BRITISH COLUMBIA
0133 POLYCHAETES, INVERTEBRATES, HYDROCARBONS , FUEL OIL, DEVELOPMENT , BIOLOGICAL EFFECTS, BIOASSAY, WSF, *RESISTANCE, *INHERITANCE OF RESISTANCE, *NEANTHES ARENACEODENTATA
0254 PORTS , OIL TERMINALS, ENVIRONMENTAL EFFECTS, CANADA, TANKERS, SAFETY, *BRITISH COLUMBIA, *KITIMAT OIL PORT, *INQUIRY
0255 " POLLUTION PREVENTION, OIL TRANSFER, OIL TERMINALS, CONTINGENCY PLANNING, COASTAL WATERS, CANADA, TANKERS, SAFETY, *BRITISH COLUMBIA
0303 " OIL TERMINALS, OIL SPILLS, SPILL CLEANUP, SHORELINES, SPILL CONTAINMENT, SCOTLAND, *ESSO BERNICIA SPILL
0313 " OIL TERMINALS, OIL SPILLS, IRELAND, CRUDE OIL, TANKERS, SPILL CLEANUP, SHORELINES, *BETELGEUSE SPILL
0278 PRECIPITATION, WASTEWATER TREATMENT, SLUDGE , PRODUCT INFORMATION, *COAGULATION
0194 PREDICTIONS, OIL SPILLS, MOVEMENT, MODELS, FATE, DISPERSION, COASTAL WATERS, ALASKA , SPILL TRAJECTORIES, *WIND FIELDS
0009 PRODUCT INFORMATION, MONITORING, EQUIPMENT, *UV ANALYZER, *OIL-IN-WATER
0039 " BOOMS, SPILL CONTAINMENT, SPILL CLEANUP, SORBENTS, *SORBENT BOOMS
0040 " BOOMS, SPILL CONTAINMENT, *DISPOSABLE BOOM
0050 " FUELS , DISPERSANTS, SPILL CLEANUP
0051 " EQUIPMENT, DISPERSANTS, TOXICITY, SPILL CLEANUP, *COREXIT 9527
0053 " SPILL CLEANUP, SPILL REMOVAL, SORBENTS
0054 " BOOMS, SPILL CLEANUP, SORBENTS
0055 " EQUIPMENT, BOOMS, SPILL CONTAINMENT, SPILL CLEANUP, SPILL REMOVAL, SKIMMERS
0056 " EQUIPMENT, CANADA, BOOMS, *EEQ ANTI-POLLUTION BARGE
0060 " OIL SLICKS, OIL REMOVAL, OIL DISCHARGES, BIODEGRADATION, BALLAST , BACTERIA, SPILL CLEANUP, WASTEWATERS
0064 " EQUIPMENT, DESIGN-ENGINEERING, SPILL CLEANUP, SKIMMERS
0065 " EQUIPMENT, SPILL CLEANUP, WASTEWATERS, SKIMMERS
0066 " EQUIPMENT, SPILL CLEANUP, SPILL REMOVAL, SKIMMERS
0068 " POLLUTION CONTROL, EQUIPMENT, SKIMMERS, SPILL REMOVAL
0069 " DISPERSANTS, SPILL CLEANUP, SPILL REMOVAL
0074 " SPILL CLEANUP, SORBENTS, *HEAVY VISCOSITY OILS
0075 " SORBENTS, SPILL REMOVAL, *SORBENT MATS
0093 " POLLUTION PREVENTION, POLLUTION CONTROL, EQUIPMENT, BOOMS, SPILL CLEANUP, SORBENTS, SPILL CONTAINMENT, *UNDERWATER CANOPY

0095 PRODUCT INFORMATION, POLLUTION PREVENTION, EQUIPMENT, *OIL STOP VALVE
0097 " POLLUTION PREVENTION, LAKES , INLAND, GROUNDWATER, RIVERS, *IMPERVIOUS UNDERGROUND BARRIER
0099 " POLLUTION PREVENTION, EMULSIFIERS, DISPERSANTS, SPILL CLEANUP
0240 " PIPELINES, MONITORING, LEAKAGE, EQUIPMENT, DETECTION, DESIGN-ENGINEERING
0263 " OIL-WATER SEPARATION, FILTRATION, EQUIPMENT, EMULSIONS, COALESCENCE, WASTEWATER TREATMENT
0273 " WASTEWATER TREATMENT, REFINERIES, *ACTIVATED CARBON
0278 " PRECIPITATION, WASTEWATER TREATMENT, SLUDGE , *COAGULATION
0279 " OIL REMOVAL, EQUIPMENT, WASTEWATER TREATMENT, SKIMMERS
0280 " WASTEWATER TREATMENT
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0286 " OIL-WATER SEPARATION, BALLAST , *BARGE
0289 " OIL-WATER SEPARATION, FILTRATION, EQUIPMENT, COALESCENCE
0291 " OIL-WATER SEPARATION, GRAVITY SEPARATION, EQUIPMENT
0292 " OIL-WATER SEPARATION, HYDROCARBONS , WASTEWATERS
0296 " OIL-WATER SEPARATION, EQUIPMENT
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0206 " POLLUTION CONTROL, OIL INDUSTRY, EXPLORATION , ENVIRONMENTAL PROTECTION, ECONOMICS, REFINING
0190 PRUDHOE BAY, OIL SLICKS, OFFSHORE DEVELOPMENT, NOAA, MODELS, ICE, FATE, BEHAVIOR, ARCTIC, ALASKA , *OCSEAP
0306 PUERTO RICO, FUEL OIL, COASTS, TANKERS, SPILL CLEANUP, SHIPS, *PECK SLIP SPILL
0314 " OIL SPILLS, FUEL OIL, BAYS
0334 " OIL SPILLS, CONTAMINATION, BEACHES, OIL TANKERS, REFINERIES
0246 PUGET SOUND, TANKERS, REGULATIONS, USCG, *TANKER BAN
R008 " OIL SPILLS, MODELS, HYDROCARBONS , ENVIRONMENTAL EFFECTS, BASELINE STUDIES, SPILL TRAJECTORIES, STRAIT OF MAGELLAN
0299 RECLAMATION, LUBRICATING OIL, ECONOMICS, CRANKCASE OIL, COST ANALYSIS, WASTE OIL, REFINING, RECYCLING
0319 " OIL DISCHARGES, NEW YORK, LEAKAGE, GASOLINE, FUEL OIL, SPILL CLEANUP, USCG
0148 RECOVERY, OIL SPILLS, FUEL OIL, CALIFORNIA, BIOLOGICAL EFFECTS, SANSINENA SPILL
0304 " FUEL OIL, TANKERS, SPILL CLEANUP, SPILL SOUTH CAROLINA, *ARIES SPILL
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0017 REFINERIES, MONITORING, FISH, BIOLOGICAL EFFECTS, BIOASSAY, ANALYTICAL TECHNIQUES, WASTEWATERS, WATER QUALITY, TOXICITY, *FREEZE CONCENTRATION TECHNIQUE
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0179 " LAND FARMING, BIODEGRADATION, SLUDGE , WASTE DISPOSAL, STORAGE
0208 " POLLUTION PREVENTION, POLLUTION CONTROL, FATE, ENVIRONMENTAL PROTECTION, ENVIRONMENTAL EFFECTS, ECONOMICS, COST ANALYSIS, API
0226 " POLLUTION PREVENTION, POLLUTION CONTROL, COST ANALYSIS, BOOK REVIEW, WASTEWATERS, SOCIOECONOMIC EFFECTS
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0215 " OFFSHORE PRODUCTION, OFFSHORE EXPLORATION, OFFSHORE DRILLING, EIS, US GOVERNMENT
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0122 " METABOLISM, HYDROCARBONS , FISH, BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, SUBLETHAL EFFECTS, UPTAKE, TOXICITY, *BENZENE, *TOLUENE, *TISSUES
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0152 " OIL SPILLS, OFFSHORE DEVELOPMENT, HABITATS, ENVIRONMENTAL EFFECTS, CONSERVATION, BIRDS, BASELINE STUDIES, ALASKA , WILDLIFE, *ANSER CANAGICUS
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0188 " OIL SPILLS, GROUNDWATER, FUEL OIL, FRANCE, FATE, CONTAMINATION
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0315 " OIL TRANSPORT, OIL SPILLS, NEW YORK, TANKERS, *CIBRO PHILADELPHIA SPILL
0333 " MARSHES, FUEL OIL, SPILL CLEANUP, USGC, TANKERS, SOUTH CAROLINA
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0245 " POLLUTION PREVENTION, OIL TRANSPORT, INTERNATIONAL CONVENTIONS, IMCO, CRUDE OIL WASHING, TANKERS, SHIPS, SEGREGATED BALLAST
0249 " REGULATIONS, POLLUTION PREVENTION, INTERNATIONAL CONVENTIONS, UN, SHIPS, *LAW OF THE SEA
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0180 " PAH, MICROORGANISMS, HYDROCARBONS , FRESHWATER, CONTAMINATION, BIODEGRADATION, AROMATIC HYDROCARBONS, *TRANSFORMATION RATES
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0053 " PRODUCT INFORMATION, SPILL CLEANUP, SPILL REMOVAL
0054 " PRODUCT INFORMATION, BOOMS, SPILL CLEANUP
0058 " REUSE, DISPERSANTS, ABSORPTION, SPILL CLEANUP, *POLYURETHANE FOAM
0062 " CRUDE OIL, CRANKCASE OIL, ABSORPTION, SPILL CLEANUP, *REFINED OIL, *RECLAIMED RUBBER PARTICLES
0074 " PRODUCT INFORMATION, SPILL CLEANUP, *HEAVY VISCOSITY OILS
0075 " PRODUCT INFORMATION, SPILL REMOVAL, *SORBENT MATS
0093 " PRODUCT INFORMATION, POLLUTION PREVENTION, POLLUTION CONTROL, EQUIPMENT, BOOMS, SPILL CLEANUP, SPILL CONTAINMENT, *UNDERWATER CANOPY
0259 " PATENT, OIL REMOVAL, ADSORPTION, WASTEWATERS
0260 " PATENT, ADSORPTION, WASTEWATER TREATMENT, WASTEWATERS
0275 " PATENT, OIL-WATER SEPARATION, OIL REMOVAL, ADSORPTION, WASTEWATER TREATMENT
0283 " PATENT, ABSORPTION, WASTEWATER TREATMENT, *POLYURETHANE FOAM
0298 " PATENT, OIL-WATER SEPARATION, OIL REMOVAL, ABSORPTION, WASTEWATERS
0310 " SHIPS, MISSISSIPPI RIVER, LOUISIANA, EQUIPMENT, TAR, SPILL CLEANUP
0339 " NORWAY, MONITORING, EQUIPMENT, DESIGN-ENGINEERING, BOOMS, SPILL CLEANUP
0018 SOURCE IDENTIFICATION, OIL SPILLS, MARINE ENVIRONMENT, CHEMICAL ANALYSIS, CANADA
0020 " SANTA BARBARA CHANNEL, OIL SPILLS, NATURAL SEEPAGE, MARINE ENVIRONMENT, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, TAR, TANKERS, SPECTROSCOPY
0029 " SAMPLING, OIL SPILLS, ANALYTICAL TECHNIQUES, SPECTROSCOPY
0030 " HYDROCARBONS , DETECTION, ANALYTICAL TECHNIQUES, ADSORPTION, SPECTROSCOPY, *MOLECULAR SIEVE 5A
0034 " PHYSICAL EFFECTS, ANALYTICAL TECHNIQUES, WEATHERING, SPECTROSCOPY, *IR, *SIMULATION
0035 " OIL SPILLS, ANALYTICAL TECHNIQUES, WEATHERING, SPECTROSCOPY, *IR, *DATA BASE
0036 " PETROLEUM PRODUCTS, LEAKAGE, FUEL OIL, DETECTION, CONTAMINATION, STORAGE, *TAGGING
0037 " SEA SURFACE, SAMPLING, DETECTION, ANALYTICAL TECHNIQUES, *SPECTROPHOTOMETRY
0038 " SEDIMENTS, NATURAL SEEPAGE, CRUDE OIL, TAR, *ISOTOPE RATIOS
0253 " SHIPS, OIL SPILLS, OIL DISCHARGES, LIABILITY, LAW ENFORCEMENT, CHROMATOGRAPHY, CHEMICAL ANALYSIS, BERMUDA, BALLAST , *CASE STUDY, *LITIGATION
0103 SOURCES, POLLUTION CONTROL, MONITORING, BOOK REVIEW, ANALYTICAL TECHNIQUES
0139 " HYDROCARBONS , CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, AROMATIC HYDROCARBONS, *SEASONAL VARIATIONS, *BEDFORD BASIN, *NOVA SCOTIA
0144 " OIL SPILLS, FATE, CHRONIC EFFECTS, BIODEGRADATION, BACTERIA, SPILL CLEANUP, MICROORGANISM, *PETROPHILES
0169 " OIL SPILLS, OCS, MODELS, ENVIRONMENTAL EFFECTS, CALIFORNIA, SPILL TRAJECTORIES, *ANALYTICAL METHODOLOGY
0173 " OIL DISCHARGES, MARINE ENVIRONMENT, FISHERIES, ESTUARIES, ENVIRONMENTAL EFFECTS, CHRONIC EFFECTS, BIRDS, COASTAL WATER, *SEABIRDS
0198 " PAH, OCEANS, HYDROCARBONS , GC/MS, DISTRIBUTION, AROMATIC HYDROCARBONS
0265 " SLUDGE , REGULATIONS, REFINING, OIL DISCHARGES, NATURAL SEEPAGE, MARINE ENVIRONMENT, DISPOSAL , COST ANALYSIS, WASTE OIL, *ENGINEERING, TANKERS
0304 SOUTH CAROLINA, RECOVERY, FUEL OIL, TANKERS, SPILL CLEANUP, SPILL *ARIES SPILL
0333 " RIVERS, MARSHES, FUEL OIL, SPILL CLEANUP, USGC, TANKERS
0300 SPAIN, OIL SPILLS, MOVEMENT, CRUDE OIL, COASTS, BEACHES, TANKERS, *ANDROS PATRIA SPILL
0321 " OIL SPILLS, OIL SLICKS, DISPERSANTS, CRUDE OIL, TANKERS, SPREADING, SPILL CLEANUP, *ANDROS PATRIA SPILL
0322 " SHORELINES, OIL TRANSFER, OIL SPILLS, EQUIPMENT, CRUDE OIL, TANKERS, SPILL CLEANUP, *ANDROS PATRIA SPILL
0020 SPECTROSCOPY, SOURCE IDENTIFICATION, SANTA BARBARA CHANNEL, OIL SPILLS, NATURAL SEEPAGE, MARINE ENVIRONMENT, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, TAR, TANKERS
0027 " SEAWATER, PACIFIC OCEAN, MEDITERRANEAN SEA, INDIAN OCEAN, HYDROCARBONS , CONCENTRATIONS, BALTIC SEA, ANALYTICAL TECHNIQUES, *SEA OF JAPAN , *SEA OF OKHOTSK
0029 " SOURCE IDENTIFICATION, SAMPLING, OIL SPILLS, ANALYTICAL TECHNIQUES
0030 " SOURCE IDENTIFICATION, HYDROCARBONS , DETECTION, ANALYTICAL TECHNIQUES, ADSORPTION, *MOLECULAR SIEVE 5A
0034 " SOURCE IDENTIFICATION, PHYSICAL EFFECTS, ANALYTICAL TECHNIQUES, WEATHERING, *IR, *SIMULATION
0035 " SOURCE IDENTIFICATION, OIL SPILLS, ANALYTICAL TECHNIQUES, WEATHERING, *IR, *DATA BASE
0039 SPILL CLEANUP, SORBENTS, PRODUCT INFORMATION, BOOMS, SPILL CONTAINMENT, *SORBENT BOOMS
0041 " PATENT, OIL SLICKS, COALESCENCE, SPILL CONTAINMENT
0045 " SKIMMERS, EQUIPMENT, SPILL REMOVAL, SPILL CONTAINMENT, USCG
0046 " EPA, DISPERSANTS, CALIFORNIA, API, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0047 " RIVERS, POLLUTION CONTROL, OREGON, EQUIPMENT, SPILL CONTAINMENT, *CLEANUP SERVICE
0048 " PATENT, EQUIPMENT, DESIGN-ENGINEERING, SURFACTANTS
0050 " PRODUCT INFORMATION, FUELS , DISPERSANTS
0051 " PRODUCT INFORMATION, EQUIPMENT, DISPERSANTS, TOXICITY, *COREXIT 9527
0052 " SKIMMERS, SHIPS, OIL REMOVAL, IRELAND, HARBORS

0053 SPILL CLEANUP, SORBENTS, PRODUCT INFORMATION, SPILL REMOVAL
0054 " SORBENTS, PRODUCT INFORMATION, BOOMS
0055 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, BOOMS, SPILL CONTAINMENT, SPILL REMOVAL
0057 " PATENT, EQUIPMENT, SPILL REMOVAL
0058 " SORBENTS, REUSE, DISPERSANTS, ABSORPTION, *POLYURETHANE FOAM
0059 " OIL SPILLS, OIL SLICKS
0060 " PRODUCT INFORMATION, OIL SLICKS, OIL REMOVAL, OIL DISCHARGES, BIODEGRADATION, BALLAST , BACTERIA, WASTEWATERS
0061 " PATENT, OIL-WATER SEPARATION, OIL SLICKS, EQUIPMENT
0062 " SORBENTS, CRUDE OIL, CRANKCASE OIL, ABSORPTION, *REFINED OIL, *RECLAIMED RUBBER PARTICLES
0063 " ECONOMICS, BIOLOGICAL EFFECTS, ARCTIC, SUBARCTIC REGIONS, EVNIRONMENTAL EFFECTS
0064 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING
0065 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, WASTEWATERS
0066 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, SPILL REMOVAL
0067 " SKIMMERS, SHIPS, IRELAND, EQUIPMENT, EPA, *OIL RECOVERY VESSEL, *OHMSETT FACILITY
0069 " PRODUCT INFORMATION, DISPERSANTS, SPILL REMOVAL
0070 " PETROLEUM PRODUCTS, OIL REMOVAL, LAKES , EQUIPMENT, *LAKE MARACAIBO
0072 " SKIMMERS, EQUIPMENT, DESIGN-ENGINEERING, CANADA, SPILL REMOVAL, *PUMPS
0074 " SORBENTS, PRODUCT INFORMATION, *HEAVY VISCOSITY OILS
0076 " PATENT, ADSORPTION, SPILL REMOVAL, *SAWDUST, *PARAFFIN
0077 " PATENT, ADSORPTION, SPILL REMOVAL, *CLOTH, *PARAFFIN
0078 " PATENT, SPILL REMOVAL, *SAWDUST, *PARAFFIN
0079 " OIL REMOVAL, EQUIPMENT, BOOK REVIEW
0080 " POLLUTION CONTROL
0084 " OIL TERMINALS, ESTUARIES, CRUDE OIL, CONTINGENCY PLANNING, UK, *AMLWCH SPILL
0087 " POLLUTION CONTROL, OIL SPILLS, GOVERNNENT AGENCIES, CONTINGENCY PLANNING, AMOCO CADIZ SPILL, TORREY CANYON SPILL
0088 " SHORELINES, OIL SPILLS, MARSHES, ENVIRONMENTAL EFFECTS, CORAL REEFS, CONTINGENCY PLANNING, COASTS, COASTAL ZONE MANAGEMENT, BEACHES, *COASTAL VULNERABILITY INDEX
0090 " REGULATIONS, OIL DISCHARGES, LIABILITY, GOVERNMENT AGENCIES, EPA, US GOVERNMENT, *FWPCA
0093 " SORBENTS, PRODUCT INFORMATION, POLLUTION PREVENTION, POLLUTION CONTROL, EQUIPMENT, BOOMS, SPILL CONTAINMENT, *UNDERWATER CANOPY
0096 " SAN FRANCISCO BAY, POLLUTION PREVENTION, PERSONNEL TRAINING, OIL TRANSFER, *OIL SPILL RESPONSE
0099 " PRODUCT INFORMATION, POLLUTION PREVENTION, EMULSIFIERS, DISPERSANTS
0102 " POLLUTION CONTROL, OIL SPILLS, MONITORING, LIABILITY, FISH, EQUIPMENT, CONTINGENCY PLANNING, CALIFORNIA, WILDLIFE, WATER QUALITY, *DEPARTMENT OF FISH AND GAME
0106 " MORTALITY, DISPERSANTS, BOOMS, BIRDS, TANKERS, *SHETLAND ISLANDS, *ESSO BERNICA SPILL
0144 " SOURCES, OIL SPILLS, FATE, CHRONIC EFFECTS, BIODEGRADATION, BACTERIA, MICROORGANISM, *PETROPHILES
0162 " POLLUTION CONTROL, OIL DISCHARGES, INCINERATION, FATE, BEHAVIOR, ARCTIC, SUBARCTIC REGIONS, *EXPERIMENTAL SPILLS
0225 " RISK ANALYSIS, OFFSHORE DEVELOPMENT, NORTH SEA, EQUIPMENT, ENVIRONMENTAL EFFECTS, ECONOMIC EFFECTS, BLOWOUTS
0237 " PIPELINES, LAND FARMING, ILLINOIS, CRUDE OIL, SPILL CONTAINMENT, SPILL REMOVAL
0256 " EQUIPMENT, CONTINGENCY PLANNING, BEACH CLEANUP, AMOCO CADIZ SPILL, TANKERS, *LITIGATION
0301 " SHORELINES, OIL TRANSFER, OIL SPILLS, OIL SLICKS, EQUIPMENT, TANKERS, *ANDROS PATRIA SPILL
0302 " MISSISSIPPI RIVER, LOUISIANA, GASOLINE, TANKERS, USCG, *BARGE GIM 106 SPILL
0303 " SHORELINES, SCOTLAND, PORTS , OIL TERMINALS, OIL SPILLS, SPILL CONTAINMENT, *ESSO BERNICIA SPILL
0304 " SOUTH CAROLINA, RECOVERY, FUEL OIL, TANKERS, SPILL *ARIES SPILL
0306 " SHIPS, PUERTO RICO, FUEL OIL, COASTS, TANKERS, *PECK SLIP SPILL
0307 " PIPELINES, OIL SPILLS, ICE, FUEL OIL, STREAMS, RESHWATER, *INDIANA
0308 " RIVERS, PIPELINES, ILLINOIS
0309 " SCOTLAND, RELEASE, OIL TERMINALS, MORTALITY, ENVIRONMENTAL EFFECTS, BOOMS, BIRDS, BEACHES, SPILL CONTAINMENT, TANKERS
0310 " SORBENTS, SHIPS, MISSISSIPPI RIVER, LOUISIANA, EQUIPMENT, TAR
0311 " PIPELINES, CRUDE OIL, *CLEANUP COSTS, *UTAH, *FARMINGTON BAY SPILL
0313 " SHORELINES, PORTS , OIL TERMINALS, OIL SPILLS, IRELAND, CRUDE OIL, TANKERS, *BETELGEUSE SPILL
0317 " SHIPS, OIL SPILLS, MOVEMENT, FUEL OIL, COASTS, BERMUDA, *MARI BOEING SPILL
0318 " SHIPS, MISSISSIPPI RIVER, LOUISIANA, *IRENE S. LEMOS SPILL, SHIP COLLISION
0319 " RECLAMATION, OIL DISCHARGES, NEW YORK, LEAKAGE, GASOLINE, FUEL OIL, USCG
0320 " SHORELINES, OIL DISCHARGES, MARYLAND, MARSHES, FUEL OIL, TANKERS, *LANG FONN SPILL
0321 " SPAIN, OIL SPILLS, OIL SLICKS, DISPERSANTS, CRUDE OIL, TANKERS, SPREADING, *ANDROS PATRIA SPILL
0322 " SPAIN, SHORELINES, OIL TRANSFER, OIL SPILLS, EQUIPMENT, CRUDE OIL, TANKERS, *ANDROS PATRIA SPILL
0325 " OIL SPILLS, CRUDE OIL, TANKERS, TEXAS, *ESSO BAYWAY SPILL

0330 SPILL CLEANUP, SHIPS, OIL SPILLS, JAPAN, FUEL OIL, ENVIRONMENTAL EFFECTS, ECONOMIC EFFECTS, *JUPITER GAS SPILL
0332 " OIL SPILLS, IRELAND, DISPERSANTS,TANKERS, *BANTRY BAY, *BETELGEUSE SPILL
0333 " SOUTH CAROLINA, RIVERS, MARSHES, FUEL OIL, USGC, TANKERS
0338 " PIPELINES, LIABILITY, FUEL OIL, CONNECTICUT, USCG, *WEST HAVEN SPILL
0339 " SORBENTS, NORWAY, MONITORING, EQUIPMENT, DESIGN-ENGINEERING, BOOMS
R004 " OIL SLICKS, MODELS, CONTINGENCY PLANNING, SPILL CONTAINMENT
0039 SPILL CONTAINMENT, SPILL CLEANUP, SORBENTS, PRODUCT INFORMATION, BOOMS, *SORBENT BOOMS
0040 " PRODUCT INFORMATION, BOOMS, *DISPOSABLE BOOM
0041 " SPILL CLEANUP, PATENT, OIL SLICKS, COALESCENCE
0042 " PATENT, EQUIPMENT, DESIGN-ENGINEERING, BOOMS
0043 " PATENT, DESIGN-ENGINEERING, BOOMS, *CONNECTOR ASSEMBLY
0045 " SPILL CLEANUP, SKIMMERS, EQUIPMENT, SPILL REMOVAL, USCG
0047 " SPILL CLEANUP, RIVERS, POLLUTION CONTROL, OREGON, EQUIPMENT, *CLEANUP SERVICE
0055 " SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, BOOMS, SPILL REMOVAL
0071 " SKIMMERS, PERSONNEL TRAINING, OIL SLICKS, EQUIPMENT, ENVIRONMENTAL EFFECTS, DISPERSANTS, CONTINGENCY PLANNING, CALIFORNIA, API, SPILL REMOVAL, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0093 " SPILL CLEANUP, SORBENTS, PRODUCT INFORMATION, POLLUTION PREVENTION, POLLUTION CONTROL, EQUIPMENT, BOOMS, *UNDERWATER CANOPY
0094 " SANTA BARBARA CHANNEL, PLATFORMS, NATURAL SEEPAGE, LEAKAGE, EQUIPMENT, BLOWOUTS, *SUBMERGED TENTS
0237 " SPILL CLEANUP, PIPELINES, LAND FARMING, ILLINOIS, CRUDE OIL, SPILL REMOVAL
0303 " SPILL CLEANUP, SHORELINES, SCOTLAND, PORTS , OIL TERMINALS, OIL SPILLS, *ESSO BERNICIA SPILL
0309 " SPILL CLEANUP, SCOTLAND, RELEASE, OIL TERMINALS, MORTALITY, ENVIRONMENTAL EFFECTS, BOOMS, BIRDS, BEACHES, TANKERS
R004 " SPILL CLEANUP, OIL SLICKS, MODELS, CONTINGENCY PLANNING
0045 SPILL REMOVAL, SPILL CONTAINMENT, SPILL CLEANUP, SKIMMERS, EQUIPMENT, USCG
0053 " SPILL CLEANUP, SORBENTS, PRODUCT INFORMATION
0055 " SPILL CONTAINMENT, SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, BOOMS
0057 " SPILL CLEANUP, PATENT, EQUIPMENT
0066 " SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION, EQUIPMENT
0068 " SKIMMERS, PRODUCT INFORMATION, POLLUTION CONTROL, EQUIPMENT
0069 " SPILL CLEANUP, PRODUCT INFORMATION, DISPERSANTS
0071 " SPILL CONTAINMENT, SKIMMERS, PERSONNEL TRAINING, OIL SLICKS, EQUIPMENT, ENVIRONMENTAL EFFECTS, DISPERSANTS, CONTINGENCY PLANNING, CALIFORNIA, API, *SOUTHERN CALIFORNIA PETROLEUM CONTINGENCY ORGANIZATION
0072 " SPILL CLEANUP, SKIMMERS, EQUIPMENT, DESIGN-ENGINEERING, CANADA, *PUMPS
0075 " SORBENTS, PRODUCT INFORMATION, *SORBENT MATS
0076 " SPILL CLEANUP, PATENT, ADSORPTION, *SAWDUST, *PARAFFIN
0077 " SPILL CLEANUP, PATENT, ADSORPTION, *CLOTH, *PARAFFIN
0078 " SPILL CLEANUP, PATENT, *SAWDUST, *PARAFFIN
0081 " PATENT, BEACH CLEANUP, *CRYOGENIC BEACH CLEANER
0237 " SPILL CONTAINMENT, SPILL CLEANUP, PIPELINES, LAND FARMING, ILLINOIS, CRUDE OIL
0012 SPILL TRAJECTORIES, SEA SURFACE, REMOTE SENSING, NOAA, MOVEMENT, MONITORING, DETECTION
0169 " SOURCES, OIL SPILLS, OCS, MODELS, ENVIRONMENTAL EFFECTS, CALIFORNIA, *ANALYTICAL METHODOLOGY
0194 " PREDICTIONS, OIL SPILLS, MOVEMENT, MODELS, FATE, DISPERSION, COASTAL WATERS, ALASKA , *WIND FIELDS
0195 " REMOTE SENSING, OIL SLICKS, MODELS, *LANDSAT DATA
R008 " PUGET SOUND, OIL SPILLS, MODELS, HYDROCARBONS , ENVIRONMENTAL EFFECTS, BASELINE STUDIES, STRAIT OF MAGELLAN
0321 SPREADING, SPILL CLEANUP, SPAIN, OIL SPILLS, OIL SLICKS, DISPERSANTS, CRUDE OIL, TANKERS, *ANDROS PATRIA SPILL
0335 " FRANCE, COASTS, AMOCO CADIZ SPILL,TANKERS
0234 STATISTICAL ANALYSIS, OIL SPILLS, INFORMATION SYSTEMS, TANKERS, *1942-1978 SPILLS, *WORLDWIDE SPILL REPORTING NEEDS
0231 STATISTICS, OIL TRANSPORT, OIL SPILLS, AMOCO CADIZ SPILL, TANKERS
0232 " OIL TRANSPORT, OIL SPILLS, TANKERS, *ANNUAL DATA
0003 STORAGE, NOAA, MONITORING, MODELS, MARINE ORGANISMS, GULF OF MEXICO, ENVIRONMENTAL EFFECTS, BASELINE STUDIES, STRATEGIC PETROLEUM RESERVE, *BRINE DISPOSAL
0036 " SOURCE IDENTIFICATION, PETROLEUM PRODUCTS, LEAKAGE, FUEL OIL, DETECTION, CONTAMINATION, *TAGGING
0179 " SLUDGE , REFINERIES, LAND FARMING, BIODEGRADATION, WASTE DISPOSAL
0243 " POLLUTION PREVENTION, BALLAST , *UNDERWATER TANKS, DESIGN-ENGINEEEERING
0251 " PETROCHEMICALS, LEAKAGE, GUIDELINES, GROUNDWATER, CONTAMINATION, CANADA
0288 " PLATFORMS, OIL-WATER SEPARATION, OFFSHORE PRODUCTION, MONITORING, EQUIPMENT, *PARALLEL PLATE SEPARATORS, *GAS FLOTATION
0193 STRAIT OF MAGELLAN, OIL SLICKS, MOVEMENT, MODELS, FATE, DRIFT, BEHAVIOR, PREDICTION
R008 " SPILL TRAJECTORIES, PUGET SOUND, OIL SPILLS, MODELS, HYDROCARBONS , ENVIRONMENTAL EFFECTS, BASELINE STUDIES
0003 STRATEGIC PETROLEUM RESERVE, STORAGE, NOAA, MONITORING, MODELS, MARINE ORGANISMS, GULF OF MEXICO, ENVIRONMENTAL EFFECTS, BASELINE STUDIES, *BRINE DISPOSAL
0307 STREAMS, SPILL CLEANUP, PIPELINES, OIL SPILLS, ICE, FUEL OIL, RESHWATER, *INDIANA

0063 SUBARCTIC REGIONS, SPILL CLEANUP, ECONOMICS, BIOLOGICAL EFFECTS, ARCTIC, EVNIRONMENTAL EFFECTS
0162 " SPILL CLEANUP, POLLUTION CONTROL, OIL DISCHARGES, INCINERATION, FATE, BEHAVIOR, ARCTIC, *EXPERIMENTAL SPILLS
0107 SUBLETHAL EFFECTS, FUEL OIL, CRUDE OIL, BIOLOGICAL EFFECTS, ALGAE, WSF, TOXICITY, *MICROALGAE, *PH, *PHOTOSYNTHESIS, *O2 EVOLUTION
0113 " MORTALITY, GULF OF MEXICO, FUEL OIL, CRUSTACEANS, CONCENTRATIONS, BIOASSAY, TOXICITY, WSF, *LUGIA EXOTICA
0119 " PHYTOPLANKTON, MORTALITY, GROWTH, CRUDE OIL, BIOLOGICAL EFFECTS, ARCTIC, *DIATOMS
0120 " RELEASE, MORTALITY, GROWTH, FUEL OIL, FISH, WSF, TOXICITY, UPTAKE, *JET FUEL
0122 " RELEASE, METABOLISM, HYDROCARBONS , FISH, BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, UPTAKE, TOXICITY, *BENZENE, *TOLUENE, *TISSUES
0149 " SANTA BARBARA CHANNEL, NATURAL SEEPAGE, MARINE ORGANISMS, MARINE ENVIRONMENT, INVERTEBRATES, HABITATS, CHRONIC EFFECTS
R007 " PAH, INVERTEBRATES, HYDROCARBONS , FISH, UPTAKE, TOXICITY, GROWTHH, RESPIRATION, *HISTOLOGY, *AUTORADIOGRAPHY
0048 SURFACTANTS, SPILL CLEANUP, PATENT, EQUIPMENT, DESIGN-ENGINEERING
0049 " SEAWATER, OIL SLICKS, OIL REMOVAL, EMULSIFICATION, BIODEGRADATION, *SALINITY
0284 " PATENT, OIL-WATER SEPARATION, DISPERSANTS, WASTEWATER TREATMENT, *MAGNETIC SEPARATION
0295 " PATENT, OIL-WATER SEPARATION, EMULSIONS, WASTEWATERS, *OZONATION
0002 SURVEILLANCE, OIL DISCHARGES, FRANCE, FOREIGN GOVERNMENTS, DETECTION, COASTAL ZONE MANAGEMENT, BALLAST
0015 " REMOTE SENSING, OIL SLICKS, CANADA, *LASER FLUOROSENSOR
0032 " OIL DISCHARGES, MONITORING, MARINE ENVIRONMENT, LEGISLATION, GUIDELINES, FOREIGN GOVERNMENTS, CHEMICAL ANALYSIS, CANADA
0016 SWEDEN, NORTH SEA, EKOFISK BLOWOUT, CONCENTRATIONS, CHEMICAL ANALYSIS
0001 TANKERS, OIL DISCHARGES, MONITORING, EQUIPMENT, DESIGN-ENGINEERING, BALLAST
0006 " POLLUTION CONTROL, OIL DISCHARGES, MONITORING, LAW ENFORCEMENT, INTERNATIONAL AGREEMENTS, HYDROCARBONS , EQUIPMENT, BALLAST
0020 " SPECTROSCOPY, SOURCE IDENTIFICATION, SANTA BARBARA CHANNEL, OIL SPILLS, NATURAL SEEPAGE, MARINE ENVIRONMENT, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, TAR
0106 " SPILL CLEANUP, MORTALITY, DISPERSANTS, BOOMS, BIRDS, *SHETLAND ISLANDS, *ESSO BERNICA SPILL
0175 " SANSINENA SPILL, PHYSICAL EFFECTS, MARINE ENVIRONMENT, HARBORS, FUEL OIL, CALIFORNIA, BIOLOGICAL EFFECTS, BASELINE STUDIES
0209 " SOCIOECONOMIC EFFECTS, OIL TRANSPORT, OIL INDUSTRY, ICE, FOREIGN GOVERNMENTS, EXPLORATION , ENVIRONMENTAL EFFECTS, ECONOMICS, DEVELOPMENT , CANADA, BEAUFORT SEA, ARCTIC
0231 " STATISTICS, OIL TRANSPORT, OIL SPILLS, AMOCO CADIZ SPILL
0232 " STATISTICS, OIL TRANSPORT, OIL SPILLS, *ANNUAL DATA
0233 " SAFETY, POLLUTION PREVENTION, PERSONNEL TRAINING, INTERNATIONAL AGREEMENTS, US GOVERNMENT
0234 " STATISTICAL ANALYSIS, OIL SPILLS, INFORMATION SYSTEMS, *1942-1978 SPILLS, *WORLDWIDE SPILL REPORTING NEEDS
0235 " SHIPS, SAFETY, REGULATIONS, POLLUTION PREVENTION, OIL TRANSPORT
0236 " PIPELINES, ENVIRONMENTAL PROTECTION, ECONOMICS, COASTAL WATERS, CANADA, US, *BRITISH COLUMBIA, *KITIMAT PIPELINE
0241 ' POLLUTION PREVENTION, OIL TRANSFER, GULF OF MEXICO, DEEPWATER PORTS, OFFSHORE TERMINALS, TEXAS
0242 " PIPELINES, OIL TRANSPORT, OIL TRANSFER, NORWAY, INTERNATIONAL AGREEMENTS, DEEPWATER PORTS, US, *LOOP
0244 ' SHIPS, POLLUTION PREVENTION, OIL DISCHARGES, IMCO, BALLAST , INTERNATIONAL CONVENTION
0245 " SHIPS, SEGREGATED BALLAST, SAFETY, POLLUTION PREVENTION, OIL TRANSPORT, INTERNATIONAL CONVENTIONS, IMCO, CRUDE OIL WASHING
0246 " REGULATIONS, PUGET SOUND, USCG, *TANKER BAN
0247 " SEGREGATED BALLAST, INTERNATIONAL AGREEMENTS, IMCO, CRUDE OIL WASHING, US, REGULATION
0250 " SAFETY, REGULATIONS, EQUIPMENT, USCG, *RADAR
0252 " SEGREGATED BALLAST, SAFETY, POLLUTION CONTROL, INTERNATIONAL CONVENTIONS, INTERNATIONAL AGREEMENTS, IMCO, CRUDE OIL WASHING
0254 " SAFETY, PORTS , OIL TERMINALS, ENVIRONMENTAL EFFECTS, CANADA, *BRITISH COLUMBIA, *KITIMAT OIL PORT, *INQUIRY
0255 " SAFETY, PORTS , POLLUTION PREVENTION, OIL TRANSFER, OIL TERMINALS, CONTINGENCY PLANNING, COASTAL WATERS, CANADA, *BRITISH COLUMBIA
0256 " SPILL CLEANUP, EQUIPMENT, CONTINGENCY PLANNING, BEACH CLEANUP, AMOCO CADIZ SPILL, *LITIGATION
0257 " PIPELINES, OIL TRANSFER, OIL TERMINALS, OIL INDUSTRY, LEGISLATION, ENVIRONMENTAL EFFECTS, CRUDE OIL, TRANS-ALASKA PIPELINE
0265 " SOURCES, SLUDGE , REGULATIONS, REFINING, OIL DISCHARGES, NATURAL SEEPAGE, MARINE ENVIRONMENT, DISPOSAL , COST ANALYSIS, WASTE OIL, *ENGINEERING
0268 " OIL-WATER SEPARATION, MEDITERRANEAN SEA, EQUIPMENT, DISPOSAL , BALLAST , WASTEWATER TREATMENT
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French Patent	
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77 120,291	0078
77 144,155	0295
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77 47,925	0298
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77 04,815	0041
Spanish Patent	
450,679	0057
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Periodicals Reviewed

Abstracts on Health Effects of Environmental Pollutants
Alternatives: Perspectives on Society and Environment
Ambio
American Fisheries Society Transactions
Analytical Chemistry
Applied Ecology Abstracts
Applied Energy
Applied Microbiology
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Aquatic Sciences & Fisheries Abstracts
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Bulletin of Environmental Contamination and Toxicology
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Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
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Chemical Week
Chemistry in Canada
Chemosphere
Coastal Engineering
Coastal Zone Management Journal
Conservation News
Current Contents: Life Sciences
Current Contents: Physical and Chemical Sciences
Deep-Sea Research/Oceanographic Bibliography
Ecological Abstracts
Ecological Modelling
The Ecologist
Ecology Law Quarterly
Effluent & Water Treatment Journal
Energy Information Abstracts
Energy Review
The Engineering Index Monthly
Environment
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Environment Reporter
Environmental Action

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Environmental Geology
Environmental Health and Pollution Control
Environmental Management
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Environmental Pollution
Environmental Research
Environmental Science & Technology
Environmental Technology and Economics
EPA Environmental News
EPA Reports Bibliography Quarterly
ERDA Energy Research Abstracts
Estuarine and Coastal Marine Science
Fuel Abstracts and Current Titles
Geochimica et Cosmochimica Acta
Government Reports Announcements
Groundwater
Hydrocarbon Processing
India Journal of Environmental Health
Industrial Wastes Information Bulletin
INTERDOK Directory of Published Proceedings
International Aerospace Abstracts
International Journal of Ecology and Environmental Science
International Journal of Environmental Analytical Chemistry
International Journal of Environmental Studies
International Petroleum Abstracts
Iranian Journal of Science and Technology
The Journal of Applied Ecology
Journal of Canadian Petroleum Technology
Journal of Chromatography
Journal of Environmental Science and Health, Part A
Journal of Environmental Sciences
Journal of the Institute of Water Pollution Control
Journal of Petroleum Technology
Journal of the Fisheries Research Board of Canada
Journal of Toxicology and Environmental Health
Limnology and Oceanography
Marine Biological Association of the United Kingdom, Journal
Marine Biology
Marine Chemistry
Marine Geology
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Marine Policy
Marine Pollution Bulletin
Marine Pollution Research Titles
Marine Science Contents Tables
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Marine Technology Society, Journal
Maritime Research Information Service Abstracts
Microbial Ecology
National Fisherman
National Research Council, News Report

National Wildlife
Nature
New Technical Books
Nippon Susan Gakkai Shi. Bulletin of the Japanese Society of Scientific Fisheries
Northwest and Alaska Fisheries Center Monthly Reports
Ocean Engineering
Ocean Industry
Ocean Management
Oceanic Abstracts
Oceanographic Abstracts and Bibliography
Oceanus
Offshore
Oil and Gas Journal
Oil Spill Intelligence Report
Outdoor California
Pacific Oil World
Petroleum Abstracts
Petroleum Engineer International
Petroleum Today
Pollution Abstracts
Pollution Engineering
Proceedings in Print
Progress in Water Technology
Rapports et Proces Verbaux
Resources
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Royal Society of London, Proceedings, Series B, Biological Sciences
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Science News
Science of the Total Environment
Scientific and Technical Aerospace Reports
Scientific Meetings
Sea Frontiers
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Selected Water Resources Abstracts
Shore and Beach
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UDS Water Quality Control Digest
Underwater Information Bulletin
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Waste Materials Biodegradation Research Titles
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Water & Pollution Control
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Water Research
Western Fisheries

APPENDIX B
OIL POLLUTION ABSTRACTS--AVAILABILITY LISTING

OSOPR-former title: OIL SPILL AND OIL POLLUTION REPORTS
OPR -former title: OIL POLLUTION REPORTS
OPA -current title: OIL POLLUTION ABSTRACTS

TITLE	REPORT PERIOD	EPA ACCESSION NUMBER	NTIS ORDER NUMBER	PRICE	PAGES
OSOPR	Jul 74-Oct 74	EPA 670/2-75-003	PB 240-719	$ 9.25	206
OSOPR	Nov 74-Feb 75	EPA 670/2-75-044	PB 242-542	10.75	261
OSOPR	Feb 75-Apr 75	EPA 670/2-75-059	PB 243-724	9.50	235
OSOPR	May 75-Jul 75	EPA 600/2-76-129	PB 258-852	12.00	315
OSOPR	Aug 75-Oct 75	EPA 600/2-76-113	PB 258-745	11.75	299
OSOPR	Nov 75-Jan 76	EPA 600/2-76-185	PB 257-886	12.50	353
OSOPR	Feb 76-Apr 76	EPA 600/2-76-215	PB 259-932	11.75	308
OSOPR	May 76-Jul 76	EPA 600/2-76-266	PB 264-870	12.50	345
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OSOPR	Nov 76-Jan 77	EPA 600/2-77-075	PB 268-248	11.75	294
OSOPR	Feb 77-Apr 77	EPA 600/2-77-111	PB 272-689	12.50	326
OSOPR	May 77-Jul 77	EPA 600/2-77-243	PB 276-691	13.00	375
OSOPR	Aug 77-Oct 77	EPA 600/2-78-005	PB 281-114	11.00	280
OSOPR	Vol. 5, No. 1 (Nov 77-Jan 78)	EPA 600/2-78-071	PB 281-671	9.25	190
OPR	Vol. 5, No. 2 (Feb 78-May 78)	EPA 600/7-78-160	PB 287-071	10.75	242
OPR	Vol. 5, No. 3 (Jun 78-Sep 78)	EPA 600/7-78-218	PB 290-227	11.75	294
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